Vet.

RECEIVED
JUL 16
VET. MED. LIBRARY

Vol. 69 No. 25 Issue No. 4133 615-634 JUNE 22nd, 1957

THE VETERINARY RECORD

The Journal of the British Veterinary Association

Patron: Her Majesty the Queen

OHIO STATE UNIVERSITY
JUL 12 1957
LIBRARY

Principal Contents

BROMOCHLOROTRIFLUOROETHANE ("FLUOTHANE"): A NEW VOLATILE ANAESTHETIC AGENT
L. W. Hall

CHRONIC COPPER POISONING IN YOUNG CALVES
A. Shand and Gwyneth Lewis

INTROMISSION PHOBIA IN THE BULL
A. F. Fraser

THE USE OF A LIVER FUNCTION TEST IN THE PROGNOSIS OF RAGWORT POISONING IN CATTLE
J. R. Lloyd

THE P.D.S.A. AND THE VETERINARY PROFESSION

THE VICTORIA VETERINARY BENEVOLENT FUND

IN BRIEF

CURRENT LITERATURE

NEWS AND COMMENT

CORRESPONDENCE

Contents

General Articles

Bromochlorotrifluoroethane (" Fluothane ") : a New Volatile Anaesthetic Agent 615
L. W. Hall, PH.D., M.A., B.SC., M.R.C.V.S.

Chronic Copper Poisoning in Young Calves 618
A. Shand, M.R.C.V.S.
Gwyneth Lewis, B.SC.

Intromission Phobia in the Bull 621
A. F. Fraser, M.R.C.V.S.

The Use of a Liver Function Test in the Prognosis of Ragwort Poisoning in Cattle 623
J. R. Lloyd, M.R.C.V.S., D.V.S.M.

In Brief :

Resistance to Infection—Nutrition 625

Current Literature :

Report 626
Book Reviews 626

The P.D.S.A. and the Veterinary Profession ... 627

The Victoria Veterinary Benevolent Fund ... 629

News and Comment :

A.I. Overseas 628
The Queen's Birthday Honours 630
The Ross Centenary 630
Harvey Tercentenary Banquet 631
University News, Edinburgh 631
" Dick " Riding Competition 631
The Royal Richmond Horse Show 631
Rabies and Bats 631
Fowl Pest in Scotland 631
Personal 632
R.C.V.S. Obituary 632
Coming Events 632
Addresses of Disease Infected Premises 632

Correspondence :

A New Anthelmintic 633
J. N. Gripper, B.SC., M.R.C.V.S.

Conditioned Reflex in a Bull 633
V. J. A. Manton, M.R.C.V.S.

Ring Womb in Ewes 633
J. W. Rainey, C.B.E., M.R.C.V.S.

Caesarean Section on Deer Carcases 634
H. B. de Roo

Diseases of Animals Act, 1950 634

I S C

" CANINOVAC "
BRAND OF
CANINE DISTEMPER VACCINE
Egg adapted " Behring "

The ideal prophylactic for Canine Distemper and Hard Pad. Easy to use—both freeze dried vaccine and solvent are packed in rubber capped vials.

Keeps for 12 months if refrigerated.

" FELIVAC "
BRAND OF
FELINE INFECTIOUS ENTERITIS VACCINE
" Graeub "

The ideal prophylactic for this virus disease. Issued in single dose rubber capped freeze dried vials.

Keeps for 12 months if refrigerated.

INTERNATIONAL SERUM CO. LTD.
The Paddocks, Frith Lane, Mill Hill, London, N.W.7
Telegrams : Interserum, Mill, London. *Telephone :* FINchley 5554

The
VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 25 JUNE 22nd, 1957 Vol. 69

Registered for Transmission as a Newspaper *Price 2s. post free*

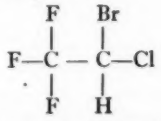
Bromochlorotrifluoroethane ("Fluothane"): A New Volatile Anaesthetic Agent

BY

L. W. HALL

Department of Veterinary Clinical Studies
University of Cambridge

"FLUOTHANE" is a new anaesthetic agent which has been developed by Imperial Chemical Industries (Raventós, 1956) and recently used in man (Johnstone, 1956; Bryce-Smith & O'Brian, 1956). It is a clear, colourless, heavy liquid with a specific gravity of 1·86 (*cf.* chloroform 1·50), a boiling point of 50·2° C., and a pungent, yet sweetish odour. Chemically it is a halogenated derivative of ethane, its structural formula being :—



Its vapour is both non-explosive and non-inflammable.

The object of this investigation was to decide if "Fluothane" is likely to become a valuable anaesthetic agent with a wide variety of uses in veterinary anaesthesia.

Clinical Trials

"Fluothane" has been administered as the sole or principal anaesthetic agent to 100 animals submitted to various operative procedures as follows :—

Operation	Horses	Cattle	Pigs	Dogs	Cats
Aural resection				6	
Caesarean hysterotomy	1	1		2	
Laparotomy	2	1	28	8	3
Mastectomy				2	
Minor surgery			3	13	1
Orchidectomy			7	1	
Orthopaedic		1		12	1
Urethrotomy		1		1	
X-ray, therapy or diagnosis				4	1
Total :	3	4	38	49	6

Methods of Administration

Liquid "Fluothane" was placed in the smaller ("Trilene") bottle of a Boyle's anaesthetic apparatus and volatilised by passing oxygen or a mixture of nitrous oxide and oxygen through the bottle. The actual concentrations of the vapour delivered to the patient have not been determined.

In 43 animals (4 cattle, 37 pigs, 1 dog and 1 cat) anaesthesia was induced by "Fluothane" vapour delivered to the patient through a close fitting face-mask. In most instances the induction of anaesthesia was smooth; where an excitement stage occurred, it was of very short duration. Breath-holding was unusual, but swallowing was often observed. Coughing was rare even when the initial concentration of the vapour was high. The time taken to induce full surgical anaesthesia, with the strongest concentration of the vapour delivered from the anaesthetic apparatus, was approximately 8 minutes in horses and cattle, and 3 minutes in dogs, pigs and cats.

In 40 animals (36 dogs and 4 cats) induction of anaesthesia was completed with "Fluothane" after the preliminary intravenous injection of a "sleep" dose of thiopentone sodium (*i.e.*, a dose of thiopentone just sufficient to produce loss of consciousness). An excitement stage was not seen in these animals.

For the remaining 17 animals "Fluothane" has been used as the maintenance anaesthetic agent after the induction of anaesthesia with thiopentone sodium.

The anaesthetic vapour has been administered by closed or semi-closed methods and anaesthesia has, in all cases, been maintained in approximately the second plane of the third stage.

Premedication

Several combinations of premedicant drugs (chlorpromazine, pethidine, atropine and hyoscine) were

used but 11 animals received no premedication. In an additional five animals the drugs used did not include atropine.

It was found that "light" premedication was desirable since "heavy" dosages of the sedative drugs prolonged both the time taken for the induction of anaesthesia and the recovery period. The absence of salivary, mucous and bronchial secretions was remarkable, even in animals which had not received atropine.

Effect on the Respiratory System

"Fluothane" caused well marked respiratory changes. The depth of respiration was always decreased. During light anaesthesia, in animals not subjected to surgical stimulation, the respiratory rate was either slightly increased or it remained within the normal range for the type and age of animal concerned. Surgical stimulation invariably caused some increase in both the rate and depth of the respiration.

Effect on the Cardiovascular System

The effect of this anaesthetic on the cardiovascular system has been studied principally in dogs. The blood pressure was measured by means of an electromanometer (Cambridge Instrument Company) after needle puncture of the femoral artery, while the electrocardiogram was recorded simultaneously using subcutaneous needle electrodes.

Administration of the vapour caused a rapid fall in the blood pressure, but after about 30 minutes of continuing "Fluothane" anaesthesia the pressure usually returned to normal. As the blood pressure fell the pulse rate became slower and the slow rate was then maintained throughout the period of anaesthesia. The hypotension was associated with obvious vasodilatation; in white pigs for example, the skin became noticeably warm, dry and pink. This vasodilatation appeared to result in marked capillary haemorrhage at the operation site.

Usually a perfectly normal electrocardiogram persisted throughout anaesthesia but extrasystoles were noted in three dogs. Similar disturbances of cardiac rhythm have been observed in dogs under thiopentone anaesthesia. The exact significance of these arrhythmias is, at the moment, most uncertain.

Abolition of Sympathetic Control

Since Raventós (1956) has shown that "Fluothane" blocks transmission of impulses in sympathetic ganglia it might be expected that this agent would interfere with the reflexes concerned in the regulation of the blood pressure. That this is indeed the case is shown by the finding that rapid loss of blood caused an immediate and precipitous fall in the blood pressure and there was no compensatory tachycardia or vasoconstriction. The blood pressure was restored, equally rapidly, by the intravenous infusion of blood, plasma, or plasma substitute, but if such replacement of the blood loss was not performed the pressure remained at a low level.

A most striking feature of "Fluothane" anaesthesia was the complete absence of the shock syndrome—tachycardia, vasoconstriction and, in some kinds of animal, sweating—during and immediately after the surgical operations. It may well be that is also related to the suppression of sympathetic activity by "Fluothane."

Muscle Relaxation

"Fluothane" anaesthesia usually provided good muscular relaxation, but it was impossible to produce completely satisfactory relaxation of the abdominal musculature while the patient was breathing spontaneously. Increasing the concentration of the vapour to abolish spontaneous respiration produced a greater degree of relaxation of these muscles but it also resulted in severe hypotension. Thus it is probably advisable to use a relaxant (*e.g.*, succinylcholine chloride), or a regional nerve block such as an epidural block, to facilitate the exploration of the peritoneal cavity when using "Fluothane" anaesthesia.

The Use of Muscle Relaxants During "Fluothane" Anaesthesia

Succinylcholine chloride ("Scoline," Allen & Hanbury) was administered intravenously to three horses, six dogs, one cat and two pigs under "Fluothane" anaesthesia. The dose of succinylcholine chloride used for the horses was approximately 0·15 mg. per kg., while the dogs received 0·3 mg. per kg. and the cat and pigs 1 mg. per kg. The effects produced were identical to those seen when similar doses of this muscle relaxant are used with other anaesthetic agents.

In view of reports (Johnstone, 1956) suggesting that profound hypotension and a fall in pulse rate might be expected if d-tubocurarine chloride was given to animals under "Fluothane" anaesthesia, this relaxant was given to only two dogs. A 10 kg. mongrel dog was given 1·0 mg. of d-tubocurarine chloride ("Tubarine," Burroughs Wellcome & Co.). The blood pressure declined from 90/50 to 50/30 (*i.e.*, the systolic pressure dropped from 90 to 50 mm. of mercury, while the diastolic pressure fell from 50 to 30 mm.), and spontaneous respiration ceased, but the pulse rate did not change. Towards the end of the operation the intravenous injection of 0·65 mg. (1/100th grain) of atropine sulphate followed by 2·5 mg. of neostigmine restored spontaneous respiration and the blood pressure then recovered immediately to 75/50. A similar response was obtained in the other dog which weighed 11·5 kg. and was given 1·5 mg. of d-tubocurarine chloride.

Recovery from "Fluothane" Anaesthesia

Consciousness usually returned within 10 minutes of discontinuing the administration of the anaesthetic. This rapid return of consciousness was particularly valuable in ruminants. It was noted, however, that respiratory depression due either to "Fluothane" itself or to excessive sedative premedication, prolonged the recovery period.

Recovery was usually completely free from post-anaesthetic narcotic excitement. Two animals, one of which was a pig which had not been starved prior to operation, vomited during recovery from anaesthesia. Some animals showed generalised shivering as consciousness was returning.

Selected Cases

A number of selected cases are described below in note form to illustrate the course of "Fluothane" anaesthesia.

1. *Mare; four years; 300 kg.; repair of a argel umbilical hernia.*

Healthy animal, no abnormality other than the hernia.

Premedication.—250 mg. chlorpromazine, intramuscularly, 90 minutes prior to anaesthesia.

Anaesthetic.—Thiopentone sodium 3·0 grammes. Succinylcholine chloride 40 mg. intravenously, no restraint necessary. Animal "went down" quietly. Intubated and anaesthesia maintained on "Fluothane"/nitrous oxide/oxygen using a semi-closed circuit with carbon dioxide absorption.

The respiratory rate was 8 per minute throughout the operation, while the pulse rate fell gradually from 100 to 52 beats per minute.

100 ml. of liquid "Fluothane" were used in 57 minutes.

Subsequent progress.—Hobbles were applied at the end of the operation, and the mare was restrained for one hour. The animal stood up immediately after the hobbles were removed and walked to a loose-box. Recovery from the operation was uneventful.

2. *Cow (Jersey × Friesian); five years; 320 kg.; Caesarean hysterotomy; dead calf.*—Fair operative risk.

No premedication.

Anaesthetic.—Paravertebral block of T13, L1, L2 and L3 nerves on the left side, using 20 ml. of 1 per cent. lignocaine hydrochloride for each nerve. Cast and restrained in right lateral recumbency. Anaesthesia induced with "Fluothane"/nitrous oxide/oxygen by face-mask. Cuffed endotracheal tube passed through the mouth after 8 minutes. Anaesthesia maintained on a semi-closed circuit with carbon dioxide absorption.

The respiratory rate varied between 30 and 50 per minute, while the pulse rate decreased gradually from 100 to 80 beats per minute.

80 ml. of liquid "Fluothane" were used during the 80 minutes of anaesthesia.

Subsequent progress.—Endotracheal tube removed after 10 minutes. Sitting up on brisket after a further 6 minutes. Walked back to loose-box 30 minutes later. Recovery from the operation was uneventful.

3. *Pig; 70 kg.; 1·5 litres of blood were to be removed and 1 litre of dextran to be infused.*

No premedication.

Anaesthetic.—The pig was restrained and anaesthesia induced with "Fluothane"/oxygen by mask. No breath holding; consciousness was lost and all struggling ceased within 25 seconds. Anaesthesia maintained on a semi-closed circuit without endotracheal intubation or carbon dioxide absorption.

70 ml. of liquid "Fluothane" were used in 50 minutes anaesthesia.

Subsequent progress.—Recovery was rapid. The pig was walking about 15 minutes after the termination of the anaesthetic.

4. *Mongrel bitch; six years; 16 kg.; Ovarohysterectomy for "open pyometritis."*—Fair operative risk.

Premedication.—Atropine sulphate 0·6 mg. (1/100th grain) subcutaneously, 50 minutes before operation.

Anaesthetic.—Thiopentone 0·15 grammes. Induction of anaesthesia completed with "Fluothane"/oxygen by face-mask. Intubated and anaesthesia maintained with "Fluothane"/oxygen using a completely closed circuit. Muscle relaxation obtained with 12·5 mg. succinylcholine chloride and respiration controlled. 50 ml. of 0·9 per cent. sodium chloride and 50 ml. of stored blood given by drip infusion.

Subsequent progress.—Recovery from anaesthesia was rapid, the bitch regaining the standing position within 14 minutes. The animal became excited and vomited once during the recovery period. Recovery from the operation was smooth and the animal was discharged from hospital eight days after operation.

5. *Cat; male; 11 years; 5·5 kg.; Extraction of molar teeth.*

Premedication.—Pethidine hydrochloride 10 mg. and atropine sulphate 0·3 mg. (1/200th grain), intramuscularly, 50 minutes before operation.

Anaesthetic.—0·075 grammes thiopentone; 5.0 mg. of succinylcholine chloride. Intubated and anaesthesia maintained with "Fluothane"/oxygen using an Ayre's T-piece. Operation proved to be difficult and the duration of anaesthesia was 85 minutes.

Subsequent progress.—The cat was walking about 10 minutes after the anaesthetic was discontinued. Recovery from the operation was free from complications.

There were no deaths under anaesthesia, but one horse died four days after operation and it is possible that the anaesthetic contributed towards the death of this animal.

* * *

A mare which had been subjected to caesarean hysterotomy was found to be incapable of extending her hind fetlock joints when she attempted to stand up after recovering from the anaesthetic. There was no withdrawal response when the hind legs were pricked with a pin. In all other respects the animal appeared normal; appetite was good and there was no incontinence of urine or faeces. There was evidence of a slow return of sensation in the hind legs and their motor power gradually improved. The mare made increasingly more vigorous attempts to rise to her feet, but unfortunately her efforts became so violent that she burst her abdominal wound in the early hours of the fourth day after operation. No gross lesions were found on *post-mortem* examination.

Conclusions

1. Induction of anaesthesia with "Fluothane" is smooth and rapid. This rapidity of induction is particularly useful in pigs, since in these animals it reduces struggling and squealing to a minimum. Recovery from anaesthesia is similarly rapid and is usually free from undesirable complications.

2. Although "Fluothane" anaesthesia provides adequate conditions for the performance of most surgical procedures, for certain intra-abdominal operations satisfactory muscle relaxation may not be obtained

(*Concluded at foot of col.* 1 *overleaf*)

Chronic Copper Poisoning in Young Calves

BY

A. SHAND and GWYNETH LEWIS

Ministry of Agriculture, Fisheries and Food, Veterinary Laboratory, Weybridge

A CONDITION has been encountered in calves which closely resembles the disease in sheep now generally accepted under the name of "chronic copper poisoning." The calves had invariably been fed on a proprietary calf milk substitute which was fortified by the addition of a copper salt. Very few references to chronic copper poisoning in the bovine can be found. Wiemann (1939) records an outbreak in cattle which had been grazing near a copper smelting plant for six weeks. Cunningham (1946) attempted to induce symptoms of chronic copper poisoning in bovines without success. Growing calves were fed 200 mg. additional copper daily for five months and then 300 mg. daily for a further six months or more; adult cattle were fed 500 mg. to 1,250 mg. additional copper daily for nine months. Kidder (1949) successfully induced generalised icterus, haemoglobinuria, and death in a steer by feeding 5 g. $CuSO_45H_2O$ daily for 122 days.

The condition now known as chronic copper poisoning in the sheep has been recognised since the end of the 19th century. Boughton & Hardy (1934) gave a review of the literature and these workers were able to show very satisfactorily that sheep fed a copper-containing mineral supplement, over a period of weeks or months, developed very high liver-copper levels without signs of ill-health. They demonstrated, however, that a proportion of these animals were liable to develop an acute illness of short duration and that this was associated with rapid destruction of red blood corpuscles, sudden onset of haemoglobinaemia, jaundice, and haemoglobinuria. Death usually followed in 12 to 48 hours though in some cases illness lasted for a few days. These authors were also able to show that once a very high liver-copper status was established, the acute-jaundice syndrome could occur weeks or months after excessive intake of copper had ceased and they also showed from clinical histories of field outbreaks and by experimental methods, that physiological or psychological stress applied to sheep with very high liver-copper status was often the factor most likely to precipitate a haemolytic crisis.

One of the present authors (A. S.) has seen a number of outbreaks of chronic copper poisoning in sheep associated with grazing the grass undergrowth of orchards in Kent. The source of copper was the dusts and sprays used on the trees, and in these outbreaks the findings of Boughton and Hardy were confirmed. It was also noted in outbreaks of typical copper poisoning, that a small proportion of sheep showed marked cirrhosis of the liver in addition to jaundice. The weight of evidence suggested that this was a part of the copper-poisoning syndrome and not due to a secondary hepatotoxic factor. Eden (1940) demonstrated experimentally that the haemolytic crisis of chronic copper poisoning was associated with a premonitory rise of blood copper levels to as high as 10 times normal. The most recent description of copper poisoning in sheep in British literature are given by Ogilvie (1954) and Clegg (1956), and they review the literature to date.

History and Symptoms in Calves

The first outbreak occurred in a group of 21 calves during the period from the end of October to the beginning of December, 1955. The first specimen received was the carcase of a calf aged 10 weeks and it had died after an afebrile illness of seven days during which very marked jaundice developed. During this period there was an initial loss of appetite, partial recovery, and then a period of two days with complete loss of appetite, followed by death. At *post-mortem* examination there was a very marked generalised jaundice and excess of blood-stained fluid in the abdominal, thoracic, and pericardial cavities. The liver was bright ochre yellow in colour, and there

---

Bromochlorotrifluoroethane ("Fluothane"): A New Volatile Anaesthetic Agent.—*Concluded.*

while the patient is breathing spontaneously.

3. Under "Fluothane" anaesthesia the blood pressure and pulse rate are both decreased, but these effects do not appear to be harmful to the patient provided that no excessive blood loss occurs during the operation.

4. The greatest disadvantage shown by this new anaesthetic agent is the depression of the respiration which is a constant feature of "Fluothane" anaesthesia. This depression can be so severe as to necessitate the performance of controlled or assisted respiration.

5. The observations made in this series of 100 cases indicate that "Fluothane" may prove to be a useful anaesthetic agent in veterinary practice. Because of the potency of this new agent and the ease with which it may be administered it should prove to be of particular value for the performance of minor operations where the blood loss is likely to be small, and a rapid recovery is required.

Acknowledgments.—I wish to thank Imperial Chemical Industries for the supplies of "Fluothane,"* and my surgical colleagues for allowing me to use this new anaesthetic drug on their patients.

Note.—It is understood from Imperial Chemical Industries that it will be some months before supplies of "Fluothane" will become available for use in veterinary practice.

References

RAVENTÓS, J. (1956). *Brit. J. Pharmacol.* **11.** 394.
JOHNSTONE, M. (1956). *Brit. J. Anaesth.* **28.** 392.
BRYCE-SMITH, R., & O'BRIAN, H. D. (1956). *Brit. med. J.* **ii.** 969.

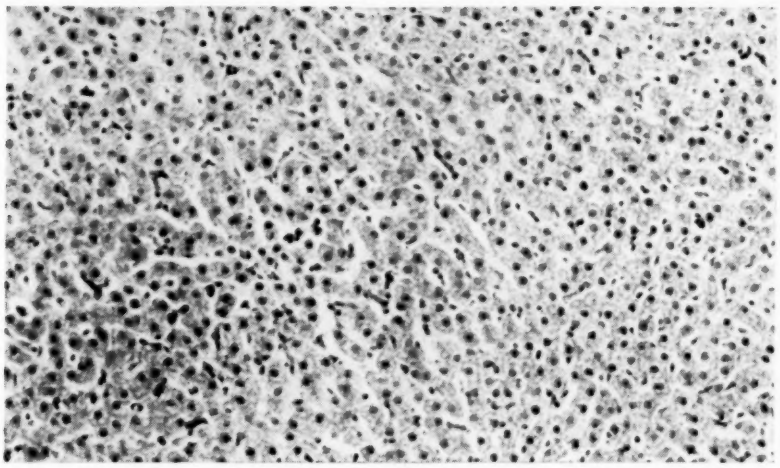


PLATE I.—Normal liver from cow's-milk fed control. H. & E. x 350.

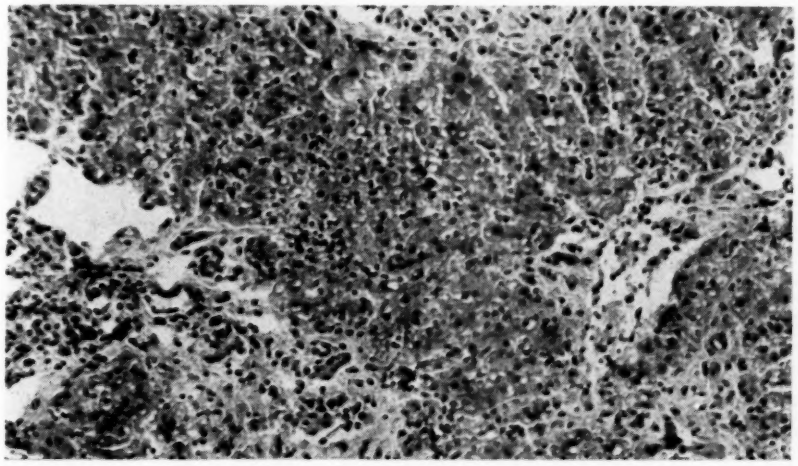


PLATE II.—Liver from field case. H. & E. x 350.

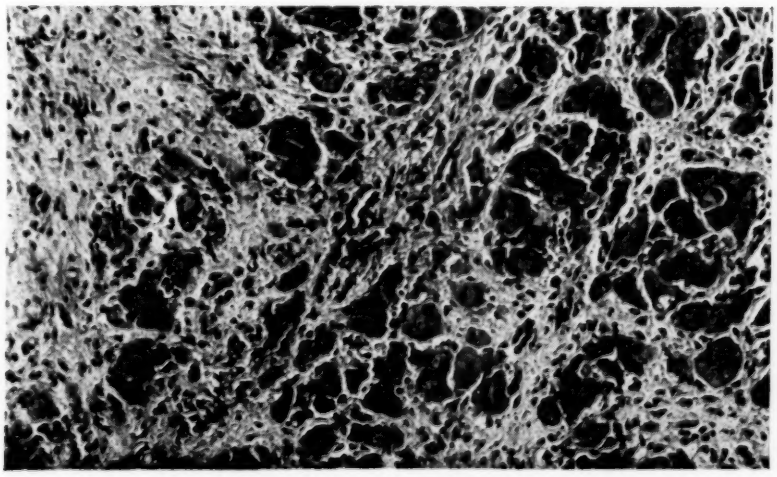


PLATE III.—Liver from field case. H. & E. x 350.

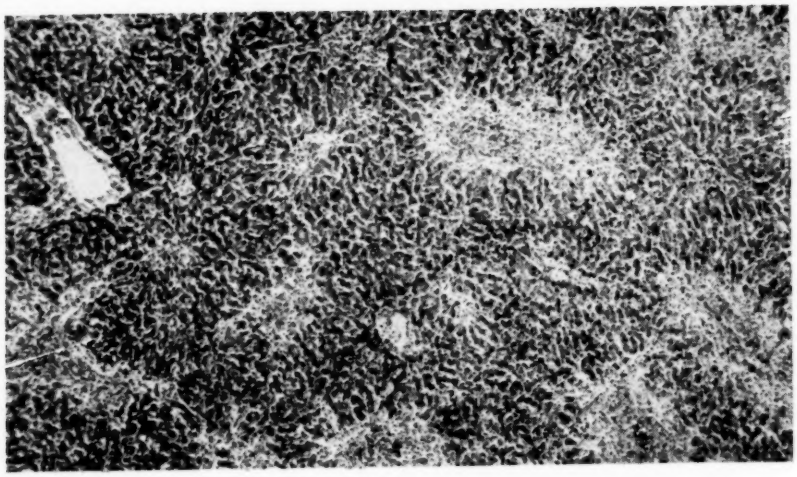


PLATE IV.—Liver from experimental calf, milk substitute fed. H. & E. x 100.

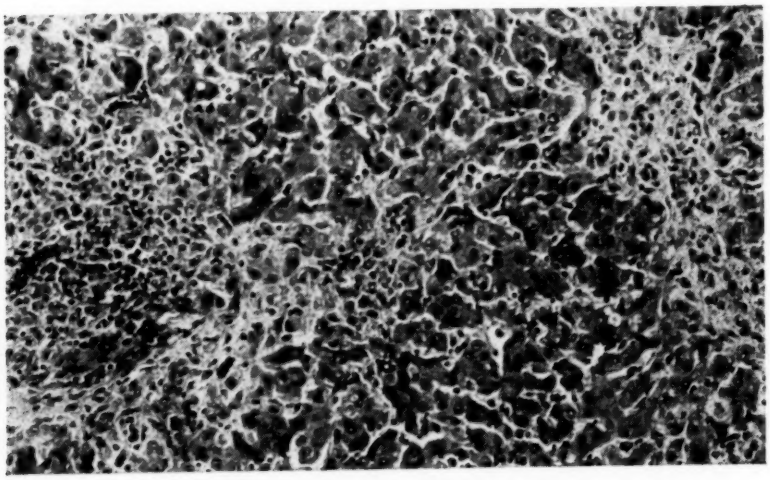


PLATE V.—Liver from experimental calf, milk substitute fed. H. & E. x 350.

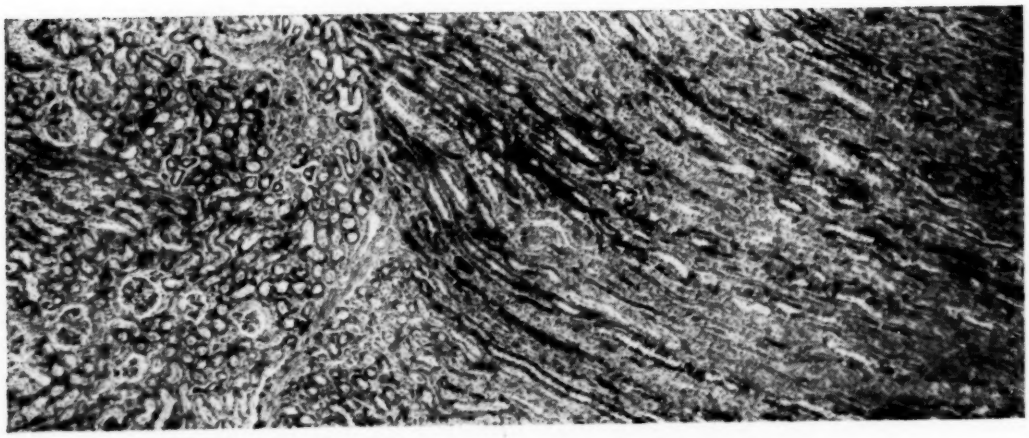


PLATE VI.—Kidney from field case. H. & E. x 100.

was dark discoloration of the kidney cortex with some enlargement of the organ. Urine present in the bladder was dark reddish-brown in colour, and haemoglobin degradation products could be demonstrated. At bacteriological examination no organism was recovered from organs normally sterile and no pathogen from other sites. Copper poisoning was suspected and examination of liver gave a figure of 2,300 p.p.m. copper on the dry matter.

On December 5th, 1955, an in-contact calf aged 12 weeks died with similar symptoms and *post-mortem* findings. Chemical examination of liver gave copper content of 1,750 p.p.m. on the dry matter. Apart from the two calves which died, every calf in the group, except one, developed jaundice at about 12 weeks of age and all such animals showed frequent micturition with blood-stained urine. They also lacked the liveliness common to calves of this age, and a high proportion lost appetite to a varying degree during the period of jaundice. Treatment with B.A.L. was adopted but it is very doubtful if this altered the course of the disease.

Investigations on the farm showed that the calves had been reared on reconstituted proprietary calf-milk substitute powder made up at one pound of powder to a gallon of water. This was fed in increasing amounts from four days of age until at 11 days the calves received one gallon of reconstituted milk substitute. At six weeks an extra quart was given per day if the calf's appetite warranted it. From the eighth week the intake was reduced and the calves were weaned at 11 weeks. Calf nuts were introduced at four weeks, and two pounds per day were being fed by the 10th week. Hay was available from the 21st day. It was shown that the calf-milk substitute contained added copper. Copper estimations were carried out on the remaining milk substitute powder available in the last eight sacks to be used on the farm and the following results were obtained:—

Milk Substitute Powder	Copper p.p.m./D.M.
1	80
2	125
3	130
4	125
5	125
6	80
7	150
8	105
Mean	115 p.p.m.

Other calf foods in use at the time of the outbreak were also examined, with the following results:—

	Copper p.p.m./D.M.
Hay No. 1	10.0
Hay No. 2	5.8
Calf Nuts	7.0

At the end of November, 1955, a report of marked jaundice in two calves aged about 12 weeks on another farm was received. One died after an illness of three days, and chemical examination of the liver gave a copper content of 1,500 p.p.m./D.M. The second calf became very jaundiced, was recumbent and semi-comatose for three or four days. Treatment by transfusion of dam's blood was carried out and it is not known if this influenced the course of the disease. Recovery took place, however, and at the end of December the calf was reported to be almost normal with jaundice clearing rapidly. Bacteriological examination of liver, kidney, and blood from the dead calf produced no pathogen. Agglutination test for Leptospira was negative, and microscopical examination of liver and kidney failed to reveal this organism. Biological test for leptospirosis was also negative. A third calf in the group remained healthy throughout the period when calf milk substitute was fed. Chemical examination of the foods being used at the time of the outbreak gave the following results:—

	Copper p.p.m./D.M.
Milk Substitute Powder	80
Calf Nuts	40
Oats	4.9

On this farm the calves were fed dam's milk for 10 days, starting at eight pints and increasing to 10 pints. Milk substitute was then introduced at this level and increased so that calves were receiving 12 pints per day at one month. The amount was then gradually increased to 18 pints per day and then reduced again so that the calves were coming off milk substitute after 12 weeks. One pound of milk substitute powder was made up to a gallon with water. Concentrates, comprising equal parts by weight of nuts and crushed oats were introduced at half a pound per head per day at four weeks. Hay was also available.

Two further outbreaks were encountered but these will not be described in detail. On all four farms individual cases occurred as the animals reached the critical age. The onset of illness and jaundice was more or less rapid and there was practically always a history of passage of dark coloured urine. At *post-mortem* examination the bladder was sometimes empty but haemoglobin degradation products could be demonstrated in urine samples obtained. It was possible to collect blood samples from one animal before it died and the copper content was 0.40 mg. per cent. or about four times normal. The serum was deep yellow in colour and contained chiefly bile pigments, this being associated with the fact that this particular calf lived for nine days after appearance of jaundice. At *post-mortem* examination all tissues were a deep chrome yellow colour and the liver bright yellow, very cirrhotic and as firm as hard rubber. In all other calves which died the period of illness varied from a few hours to seven days after the appearance of jaundice and there was evidence of very severe and widespread damage to the liver which remained normal in consistency but deep ochre in colour. Liver copper values ranged from 1,400 to 2,800 p.p.m./D.M. The morbidity and mortality rate varied. As already described, in one outbreak 20 out of 21 calves

became ill, two died and the remaining sick animals recovered. In another outbreak four out of 14 animals became sick and died and the remainder although on the same diet, remained clinically healthy. In one outbreak the first appearance of symptoms was delayed for a week or two after high copper milk substitute feeding had ceased. All these variations from classical haemolytic crisis with rapid destruction of liver tissue have been described in copper poisoning in the sheep. In view of the fact that it is accepted that a stress of some kind acts as a trigger mechanism in the latter animal, it is perhaps significant that all outbreaks in the calf occurred during or soon after weaning.

Experimental Feeding Trial

As a result of these investigations and reports from other Ministry Laboratories that similar outbreaks were being encountered, it was decided to run a feeding experiment. There was no indication that large numbers of outbreaks were occurring in the country, and, in view of the large amount of the particular milk substitute being sold, it was not thought that it would be possible to produce clinical symptoms in a small group of experimental calves. As a result of experience with copper poisoning in the sheep, however, it was felt that it would not be difficult to produce storage of potentially dangerous amounts of copper in calf livers, if the suspect calf food was at fault. The calf food was obtained from the local supplier and analysis of the 14 sacks used gave copper values ranging from 63 to 84 p.p.m., with a mean value of 72 p.p.m./D.M. The calf food was also fed with its copper content adjusted to 115 p.p.m./D.M., this being the mean figure obtained from samples in the first outbreaks. Seven Ayrshire calves aged about one week were divided into three groups, three being fed cow's milk throughout and two on reconstituted milk substitute prepared by the addition of 1 lb of commercial powder to one gallon of water. A further two calves received reconstituted milk sub- to substitute with the addition of copper sulphate. The latter four calves were fed the following amounts of prepared calf food:—

Age	Reconstituted milk substitute per day
From 7 to 14 days	4 quarts
3 to 4 weeks	5 ,,
5 to 10 ,,	6 ,,
10 to 11 ,,	7 ,,
11 to 12 ,,	8 ,,
12 to 13 ,,	9 ,,

It is realised that the amounts fed were in excess of those generally recommended for dairy calves, but the primary object of the experiment was to discover if potentially dangerous amounts of copper could be stored. The milk fed calves were given as nearly as possible equivalent volumes of milk but one animal, No. 401, suffered from intermittent gastro-intestinal upset, thus reducing the total milk intake. The animals otherwise remained healthy and were slaughtered at the end of the 13th week. Concentrates were not fed. An allowance of half pound of hay per head per day was allowed and they were bedded on good quality straw.

Chemical examination of liver and kidney for copper gave the following results:—

Experimental Calves

Tissue copper values at 13 weeks of age

Identification	Liver copper p.p.m./D.M.	Kidney copper p.p.m./D.M.
472 Control (Milk) ...	51	18
335 ,, ,, ...	110	22
401 ,, ,, ...	390	13
333 Milk Substitute ...	3,000	110
334 ,, ,, ...	1,600	40
332 Milk Substitute + Cu	3,600	60
336 ,, ,, ,, ,,	2,100	38

It will be seen that the liver copper content of the milk-fed calves falls within the normal range, and that the copper content of livers of all milk-substitute calves is within the range accepted as being potentially dangerous in sheep. The liver copper status of the milk-substitute calves also corresponds to that encountered in field cases of copper poisoning in the calf. The milk substitute fed calves were never weaned or as far as could be judged ever subjected to any stress, and in future work an attempt will be made to precipitate haemolytic crisis in calves with high liver copper levels.

Histology

Liver. In field cases (Plate II) which died soon after first signs of haemolytic crisis there was marked and widespread necrosis, lobulation becoming indistinct, and the majority of liver cells enlarged with poorly defined margins and very poorly staining nuclei (compare Plate I). Some cells showed evidence of fatty infiltration. In the portal tracts there was increased bile-duct formation together with the appearance of masses of large-nucleated cells without differentiation. Some infiltration of the liver lobules with such cells could be seen. In the field case (Plate III) which was jaundiced for nine days before death there was widespread fibrosis of the liver and it was obvious that this liver damage was of considerable standing. This was the only animal seen with such advanced cirrhosis of the liver and the evidence very strongly suggested that it was a direct effect of copper poisoning.

In the experimental calves receiving milk substitute containing 72 and 115 p.p.m. copper there was evidence of liver damage in spite of the fact that the animals remained healthy (Plates IV and V). Lobule formation and the central vein were not distinct, many liver cells were larger than normal (compare Plate I), and many nuclei stained faintly. The cell boundaries were not sharp. In the portal tracts were masses of large-nucleated cells, without differentiation and similar to those seen in field cases. A few leulocytes were also present. There was some infiltration of liver lobules with such cells. The condition resembled subacute cholangio-hepatitis.

Kidney. The damage to the calf kidney was not as severe as in the sheep. In one field case there was marked damages to the convoluted tubules and

Intromission Phobia in the Bull

BY
A. F. FRASER
Lanark

Introduction

COITAL inability is well recognised in the bull, and such impotence is seen to exist in a variety of forms of faulty mating technique (Laing, 1955; Smith, 1953). Aetiological explanations have included:—

Bodily states of

(a) genitally proximal type, *e.g.* preputial adhesions.

(b) genitally distal type, localised or generalised, *e.g.* arthritic conditions and avitaminosis (Erb *et al.*, 1947).

Psychological states, *e.g.* relative claustrophobia, where fear of restricting surroundings inhibits the service reflex (Kerruish, 1955).

A high level of libido often overcomes coital difficulties imposed by bodily states. This is a feature of note when consideration is given to the relative importance of the two states. Further, whilst it appears at present that psychological conditions seldom respond to treatment (Rowson, 1946) which is, with present knowledge, essentially of a non-specific character, it is thought that psychological states may frequently be implicated in *impotentia coeundi*.

Symptoms

A specific form of impotence has been encountered in six herd bulls in Central Scotland. The constancy of many of the symptoms drew attention to the condition as a distinctive syndrome, in which search for evidence of existing pathological conditions revealed significantly little.

In each case a variable period of normal service was followed by the occurrence of abnormal copulatory disinclination (Petersen *et al.*, 1941) and thereafter by a pattern of service behaviour exhibited constantly by all six bulls. The features of this behaviour are as follows:—

There exists a strong sexual drive creating a speedy approach to the oestrous cow.

In the mounted position there is inadequate coverage of the cow with consequent failure to create close genital apposition.

Noticeable flexion of the hind limbs is featured with a resultant unsatisfactory attainment of reach and height.

A degree of lordosis is shown by spinal concavity in the lumbar region.

The penis is directed at a point on the escutcheon well below the vaginal level.

Rapid pelvic motion occurs, but the penis exposure is much reduced.

The bull usually dismounts in a very short space of time, especially if restlessness is a feature of the cow's oestrus state (Clamohoy, 1952).

Many attempts at coition are willingly undertaken

---

in the excretory tubules were casts which showed up black or eosinophilic when Heidenhain's haematoxylin and eosin was used. In most other field cases (Plate VI) eosinophilic casts and granular material were present in only a small proportion of Bowman's capsules, convoluted tubules, and excretory tubules.

Summary

Chronic copper poisoning in calves fed on a copper-supplemented milk substitute is described. The most common characteristic was more or less sudden haemoglobinaemia and haemoglobinuria and this was associated with marked jaundice. In animals which did not die soon after the haemolytic crisis, bile pigments added to the jaundiced appearance. Liver necrosis in fatal cases was usually widespread and not as in the sheep confined to the centre of the liver lobule. The calf kidney appeared to be better able to excrete haemoglobin derivatives than the sheep and there was not so much widespread damage and blocking of tubules. The copper content of livers from field cases was over 1,300 p.p.m./D.M. and it was shown that calves fed a similar diet could store in the liver 1,600 to 3,600 p.p.m. copper on the dry matter. In one field case it was possible to obtain a blood sample before death and this was shown to have a copper content of four times normal. These findings conform to those suggested by Bull (1949) as the basis on which copper poisoning can be defined, and recognised.

Note.—As a result of consultation with the manufacturers of the calf-milk substitute, the copper content has been considerably reduced. Their co-operation and interest is gratefully acknowledged.

Acknowledgments.—We wish to thank Mr. E. E. Clements for his help in producing the photographs.

References

BOUGHTON, I. B., & HARDY, W. T. (1934). *Texas Agric. Exp. Stat. Bulletin*, No. 499.
BULL, L. B. (1949). Brit. Commonwealth Sci. Official Conf. Spec. Conf. Agric., Australia.
CLEGG, F. C. (1956). *Vet. Rec.* **68.** 332.
CUNNINGHAM, I. J. (1946). *N.Z. J. Sci. Tech.* **27.** No. 5 (Sec. A), 372.
EDEN, A. (1940). *J. Comp. Path.* **53.** 90.
KIDDER, R. W. (1949). *J Anim. Sci.* **8.** 623.
OGILVIE, D. D. (1954). *Vet. Rec.* **66.** 279.
SHAND, A. Unpublished data.
WIEMANN (1939). *Dtsch. Tierärztl. Wschr.* **47.** 279.

but little or no correction of genital placement occurs, and the impotence remains.

The full picture is of a bull showing extreme enthusiasm to serve, but unwilling to forsake the guarded posture adopted when mounted. The degree of incaution necessary for the completion of the service reflex is not attainable. Some features, such as lowering of the back and the pelvis, and the forward placing of the hind feet, recall the fright posture (Fraser, 1957).

History and Aetiology

From these considerations it would appear that the inhibition revealed specifically concerns intromission.

At this point it is important to stress the fact that the ability to lunge and ejaculate as a direct reflex result (Macirone & Walton, 1938) when contact is made with an artificial vagina is not lost by these bulls.

Most of the symptoms enumerated above have also been described by Hultnas (1953) in an unstated number of bulls in Sweden, and Kendrick (1954) in three bulls in the U.S.A. Other mention is made of forms of impotence in bulls which are vaguely similar (Bane, 1953). In each instance, however, the description is made without reference to any other report of a like condition. It is felt, therefore, that the condition may exist universally but may have failed to attract more written report or recognition.

Kendrick noted the apparent similarity of the condition to psychogenic impotence in man and called it in the bull psychic impotence. Study of the writer's six subjects provides no opposition, and a little support, for the opinion of a psychological cause. For example,

(a) With one exception all bulls acquired the condition in the age group three to five years which has been shown in the study of over 400 bulls as the most common age for the acquisition of instability of disposition (Trautwein, 1954).

(b) Every case occurred in a dairy breed (Ayrshire and Friesian) and there is some evidence that dairy breed bulls are more prone to experience anxiety states than beef breed bulls (Fraser, in press).

(c) The disposition of five of the six bulls was of neurotic type. This, however, may be the effect rather than the cause of the impotence.

In accepting the cause as a psychological one it is necessary to presuppose a history of psychic trauma resulting from a disturbing experience at copulation. Strong resentment was shown by two bulls while, in a mounted position, they were approached as for semen collection. This is very weak evidence, and in fact may only show the effect of frustration (Dollard *et al.*, 1944), so that, at present, history of any mentally distressing event must remain presupposed. Even exhaustive enquiry has failed to confirm it.

It is likely that the history must include not only pain at coition, but must also apply to the suitable subject of appropriate age, breed, type, and disposition before an inhibition is acquired of such power and type as to affect the innately organised service behaviour (Beach, 1942; 1947) in so spectacular a fashion. It is the writer's unsupported opinion that fear of dislodgement and/or intromission is implicated.

Treatment

The American treatment was firstly to re-establish the movement of lunging by using an artificial vagina. This, however, failed to improve natural mating in two cases when subsequent surgical measures to prevent retraction of the penis on mounting also failed. This was not to be regretted in view of a considerable weight of opinion (Lagerlof, 1951; Williams, 1947) condemning such operative procedures.

In the case of the Scottish bulls the writer attempted to re-establish and reinforce their coital reflexes by giving them some serving opportunities with an artificial vagina. Although this was done fairly frequently, no subsequent improvement in natural mating occurred. In three cases attempts were made to find natural service conditions acceptable to the bulls. Such conditions were discovered, to a small extent, in two cases. One bull required to be blindfolded and led quietly, when he could sometimes serve a heifer more easily covered by reason of reduced stature. The lack of vision, probably, also prompted the bull to extend further forward in mistaken judgment of position. In the second instance the bull was found capable of serving moderately successfully when allowed uncontrolled mating at pasture.

In no case has a complete solution been found. The treatment of the third bull continues, and to date has included the above features in addition to creating a mild degree of sedation by administering chloral hydrate one to two hours before an attempted service. No indication of relief of the impotence is apparent.

The enlarged abdomens encountered in bulls of this age group generally, and in these subjects, indicated the possibility of some value in fasting to reduce girth. Certainly if the girth is much increased an even higher and more precarious stance, when mounted, will be required for intromission to be possible. It is thought that some part of the moderate success, in one instance at least, was due to reduction in weight and girth. Other means of creating altered conditions such as placing the cow on a lower level than the bull have not met with success.

Conclusion

The condition appears to be an inhibition which virtually defies removal once established, and shows the need to acquire greater understanding of the psychology of cattle.

References

BANE, A. (1953). *Proc. XVth Int. Vet. Congr. Stockholm.* Part 1. **2.** 709–12.

BEACH, F. A. (1942). *Psychosom. Med.* **6.** 173–98.

———. (1947). *Physiol. Rev.* **18.** 240–307.

CLAMOHOY, L. L. (1952). *Phillip. Agric.* **35.** 478–85.

DOLLARD, J., MILLER, N. E., DOOB, L. W., MOWRER, O. H., & SEARS, R. R. (1944). "Frustration and Aggression." Kegan Paul, London.

(Concluded at foot of col. 1 overleaf)

The Use of a Liver Function Test in the Prognosis of Ragwort Poisoning in Cattle

BY

J. R. LLOYD

Elveden, Suffolk

THE importance of ragwort (*Senecio jacoboea*) poisoning in cattle is shown by the many references to the disease which are to be found in the literature. It is generally accepted that cattle do not normally eat ragwort in the growing stage but it has been shown that they will eat it if the pasture is bare and also when the plant is present in hay or silage. An extensive outbreak following the feeding of contaminated silage was described recently by Donald & Shanks (1956). The salient features of their outbreak were that contaminated silage was fed for a period of approximately 12 weeks from mid-November to early February; that death from ragwort poisoning commenced in the second half of January and continued sporadically until the end of June, that is, some five months after the contaminated ragwort was withdrawn from the ration.

The present communication also refers to an outbreak which followed the feeding of contaminated silage. This outbreak occurred in a beef herd of approximately 150 head, consisting mainly of bullocks ranging from 4 to 30 months of age. Silage was fed for a three-month period from the first week in January to the end of March, and between March and September, 28 cattle died from ragwort poisoning. The monthly incidence of cases is shown in the following table:—

MONTHLY INCIDENCE OF LOSSES FROM RAGWORT POISONING

Month	Mar.	Apr.	May	June	July	Aug.	Sept.
No. of cases	2	3	8	9	5	—	1

It will be seen from this table that the heaviest losses occurred during the months of May to July inclusive, that is, up to four months after the contaminated silage had been withdrawn from the ration.

The symptoms shown by affected cattle were those which are generally accepted as being typical of ragwort poisoning. In all cases diarrhoea occurred and was accompanied by tenesmus which gradually increased in force and frequency. Appetite was variable and nervous symptoms developed in most cases, usually showing by circling and apparent blindness, accompanied in some cases by frenzy and champing of the jaws. Emaciation was a constant feature other than in those cases which died quickly following the appearance of nervous symptoms. *Post-mortem* examinations were carried out in most cases and the findings were fairly consistent, being characterised by marked cirrhosis of the liver with petechial haemorrhages in the internal organs and serous membranes. There was invariably an excess of peritoneal fluid and oedema of the mesentery. Diagnosis was based on clinical symptoms, the findings of ragwort in the silage, and on *post-mortem* findings, including the cirrhotic changes in the liver, the latter being confirmed histologically.

It is fairly safe to assume, from a consideration of the course of this outbreak and of that reported by Donald and Shanks, that losses from ragwort poisoning may be expected to continue for several months after foodstuffs containing silage is withdrawn from the ration. When cases first appear and a diagnosis is established, a prognosis can therefore be made with some confidence that other cattle will become clinically affected at a later date. With the knowledge that further losses may be expected, it is obvious that any test which will detect animals that are likely to become clinical cases at a later date is of very considerable value. By applying such a test, these animals can be picked out and sent for slaughter before clinical disease becomes evident.

Histological Changes in the Liver

The histological changes in the liver resulting from ragwort poisoning were recently described by Betty & Markson (1954). These workers stated that the hepatic lesions are essentially those of a chronic hepatitis of portal origin, that is, caused by substances absorbed from the intestine and that the presence of toxic liver fibrosis, considered in conjunction with the clinical symptoms, is sufficient to justify a diagnosis of ragwort poisoning.

The broad histological picture is one of extensive liver degeneration, healed by haphazard regeneration of hepatic cells and extensive fibrosis. In their article, Betty and Markson reported on the use of a liver biopsy technique as a means of confirming a clinical diagnosis of ragwort poisoning and to detect subclinical disease. For the detection of the latter, liver

Intromission Phobia in the Bull.—*Concluded.*

ERB, R. E., ANDREWS, R. N., HAUGE, S. M., & KING, W. A. (1947). *J. Dairy Sci.* **30.** No. 9.
FRASER, A. F. (1957). *Brit. J. anim. Behav.* **5.** No. 2. 48–9.
———. (In press). "The Disposition of the Bull."
HULTNAS, C. A. (1953). *Proc. XVth Int. Vet. Congr. Stockholm.* Part 1. **2.** 712–7.
KENDRICK, J. W. (1954). *Cornell Vet.* **44.** 289–93.
KERRUISH, B. M. (1955). *Brit. J. anim. Behav.* **3.** No. 4. 125–30.
LAGERLOF, N. (1951). *Fertility and Sterility.* **2.** No. 3. May-June.
LAING, J. A. (1955). "Fertility and Infertility in Domestic Animals." Baillière, Tindall & Cox, London.
MACIRONE, C., & WALTON, A. (1938). *J. Agric. Sci.* **28.** 122–35.
MANRESA, M., & DIAPO, D. (1938). *Phillip. Agric.* **26.** 870–91.
PETERSEN, W. E., & SPIELMAN, A. (1941). *Proc. Soc. Exper. Bio. & Med.* **46.** 16–7.
ROWSON, L. E. A. (1946). *Proc. Brit. Soc. Anim. Prod.*
SMITH, G. F. (1953–4). *Brit. Agric. Bull.* **6.** 93–9.
TRAUTWEIN, K. (1954). *Fortpflanzung.* **4.** 197–201.
WILLIAMS, W. L. (1947). "Diseases of the Genital Organs of Domestic Animals." 3rd ed. Plimpton, Worcester, Mass.

biopsy was attempted on 26 cows in the milking herd. The operation was carried out under local anaesthesia, the instruments being washed and disinfected between each operation. The skin wounds were subsequently dressed with penicillin. Specimens of liver suitable for the preparation of sections were obtained from 25 of the 26 animals, the whole procedure taking about three-and-a-quarter hours. Liver biopsy was subsequently performed on 19 other cattle of various ages (time taken, two-and-a-half hours) and on eight yearling heifers (time taken, 50 minutes). The total time taken to carry out this operation on 53 animals was, therefore, about six-and-a-half hours. Sections were subsequently prepared from the liver biopsy specimens and four showed changes consistent with ragwort poisoning.

A liver biopsy technique is time consuming both in the field and the laboratory. It has its uses and is of undoubted value but it is sometimes difficult to carry out, particularly in beef cattle kept under ranching conditions which are unaccustomed to being handled. Such was the case in the outbreak which forms the subject of this report and for this reason other methods of diagnosis were investigated.

It seems probable that death from ragwort poisoning is the end result of impaired liver function. Betty and Markson state " Even when the damaged tissues are replaced by new hepatic cells, normal liver architecture and normal liver function are not achieved, while scarring is the negation of normal glandular function." They concluded that the changes produced in the liver were irreversible.

Liver Function Tests

Liver-function tests are widely used in human medicine and are accepted as being of considerable help in diagnosis. Their use has received less attention in the veterinary field, but a recent report described one such test for the diagnosis of liver disease in cattle (Belli & Chini, 1954). These authors used this test on the serum of 50 cattle at an abattoir; 25 out of 26 healthy cattle gave a negative result and 23 out of 24 cattle with diseased livers (principally Fasciola and Echinococcus infestation) gave a positive result.

From the description of the test it appeared to be extremely simple to carry out and interpret, and it was decided to make use of it in an attempt to pick out those cattle with subclinical ragwort poisoning. No complications in interpreting the results of the test were expected to arise from liver-fluke infestation, as this parasite is rarely found in stock in the area.

Technique of Liver Function Test

The test referred to in the report by Belli and Chini was described originally by Woolf. It consists of adding to one drop of serum one drop of the following reagent:—

Iodine	... ...	2 g.
Potassium Iodide	...	4 g.
Water	... ...	30 ml.

The test is read after one to two minutes and a positive result, indicating a liver disorder, consists of a formation of a precipitate.

Application of Test in Present Outbreak

Several deaths had occurred by the end of April, 1956, and a diagnosis of ragwort poisoning was made on the basis of clinical symptoms, the presence of ragwort in the silage, *post-mortem* findings, and histological examination of liver.

Blood samples were taken from 125 cattle on May 2nd and subjected to the liver-function test with the following results:—

Positive (evidence of liver disorder)	42
Weak positive	25
Negative	58

There was some reluctance to accept the result of this test at its face value, indicating, as it appeared to do, extensive liver damage and/or lack of function in 42 animals and less-pronounced changes in 25, the two batches together forming the majority of the herd. It was decided at this stage to await events rather than take positive action on the results of the test as this would have meant sending at least 42 beasts for slaughter.

A further 15 beasts died from ragwort poisoning between May 4th and July 1st, and of these, 12 had given a positive reaction to the test, two a weak positive, and one a negative reaction. The negative animal died six weeks after the blood test. Ten beasts, all positive to the test, were sent for slaughter on June 22nd. Varying degrees of cirrhosis were present in all livers. By this time it had become apparent that the test had succeeded in detecting the cattle with liver damage and it was decided to carry out a further test on the remainder as a basis for more positive action.

Eighty-five animals were retested on July 3rd. The following table compares the results obtained at this and the preceding test in those animals which gave a reaction other than negative at either test.

TABLE SHOWING THE RESULT OF RETESTING 85 CATTLE

Tested May 2nd			Tested July 3rd		
Positive	Weak Positive	Negative	Positive	Weak Positive	Negative
19			11	6	2
	23		10	10	3
		43	7		36

The results obtained at the two tests show a fair measure of agreement. Of the 42 animals which gave a positive or weak positive at the first test, 21 were positive at the second test and 16 weak positive (37 out of 42). Five gave a negative reaction, suggesting that in those cases liver function was restored. Seven beasts which gave a negative reaction at the first were positive at the second test, probably due to a decrease in functional activity of the liver between May and July.

Twenty-three positive reactors were sent for slaughter on July 10th and all showed liver cirrhosis. Another five beasts died from delayed ragwort poisoning in late July, four of which had given a positive reaction and one a weak positive reaction to the test carried out earlier in the month.

Discussion

The results obtained in this herd show quite clearly that if action had been taken on the results obtained in the liver function test carried out in May, a large number of subclinically affected cattle could have been salvaged for human consumption before developing symptoms of ragwort poisoning. It is clear from a consideration of this and previous reports that symptoms of ragwort poisoning may not appear until five or six months after the ingestion of the plant. It seems probable that this is due to the fact that the liver damage is progressive in type and that there is a direct correlation between the functional activity of the liver cells and the appearance of clinical symptoms. The fact that some of the cattle gave negative reactions to the blood test in May but positive reactions in July suggests that a significant upset in liver function did not develop in these animals until three or four months after the ingestion of ragwort. The results in general indicate that the application of a liver-function test at monthly or two-monthly intervals for a period of six months after an outbreak is confirmed in cattle should be sufficient to detect such delayed subclinical cases so that they can be salvaged before the appearance of clinical symptoms.

It must be emphasised that the test is one of liver function and that it is not a specific test for ragwort poisoning. Although the test gave satisfactory results in this herd, the test would be less easy of interpretation in herds with liver-fluke infestation and in such herds reliance might still have to be placed on the examination of liver biopsy specimens.

Summary

An outbreak of ragwort poisoning is described in which 28 cattle died. Most of the deaths occurred between two and four months after silage which contained the weed was withdrawn from the ration. A liver-function test gave satisfactory results in detecting cattle with subclinical disease.

Acknowledgments.—The use of this test was suggested to the writer by Mr. H. I. Field, M.SC., M.R.C.V.S., Superintendent Veterinary Investigation Officer. My thanks are due to the staff of the Veterinary Investigation Centre, Cambridge, for confirmation of clinical diagnosis by the examination of liver sections and for carrying out the liver-function tests.

References

BELLI, G., & CHINI, P. (1954). *Atti. Soc. ital. Sci. vet.* **8.** 671.
———, & ———. (1955). Abstract in *Vet. Bull.* **25.** 574.
BETTY, R. W., & MARKSON, L. M. (1954). *Vet. Rec.* **66.** 398.
DONALD, L. G., & SHANKS, P. L. (1956). *Brit. Vet. J.* **112.** 307.
———. (1953). *Ibid.* **97.** 357–66.
———. (1953a). *Ibid.* **98.** 145–55.
———. (1955). *Ibid.* **101.** 59.
HOWIE, J. W. (1949). *Brit. J. Nutr.* **2.** 331–7.
SCHNEIDER, H. A. (1946). *Vitamins and Hormones.* **4.** 35–70.
———. (1951). "Nutrition Fronts in Public Health." Serial No. 30.
———. (1945). *J. Exp. Med.* **81.** 359–84.
———. (1946). *Ibid.* **84.** 305–22.
SENGUPTA, S. R., & HOWIE, J. W. (1949). *Brit. J. Nutrition.* **2.** 313–20.
SMITH & DUBOS. (1956). *J. Exp. Med.* **103.** 109.

In Brief

RESISTANCE TO INFECTION—NUTRITION

IT is a common belief that well fed animals are generally more resistant to disease. Adequate amounts of various vitamins have been implicated in resistance to disease ; many controlled experiments have not borne out this view and some have proved the contrary to be true (Clark *et al.*, 1949 ; Schneider, 1946). The position has been reviewed by Howie (1949) and Schneider (1951).

The main conclusion that can be drawn so far is that nutritional factors essential for growth and reproduction hardly if ever play any rôle in resistance to infection unless deficiency is so great that the normal physiological status is endangered. On the other hand resistance of mice to Salmonellosis increased after adding to their diet small amounts of a fraction from germinating wheat or barley, though growth rate was unaffected (Schneider, 1945, 1946). It has also been shown that diets unsatisfactory for growth and reproduction may be superior from the point of view of resistance to tuberculous infection, as compared with diets that appear optimal according to accepted nutritional criteria (Dubos, 1950, 1953, 1953a ; Howie, 1949 ; Sengupta & Howie, 1949). Protein *per se* has been shown to exercise little effect (Dubos, 1955) ; resistance of mice to tuberculosis was as high on a diet of 25 per cent. mixed protein as with a diet containing only 7 per cent. protein. However, if the low protein diet had its calorific balance made up with glucose (Cerelose), susceptibility was exceedingly high, and only became normal when part of the glucose was replaced by peanut oil or some other fat. Sodium citrate in the diet of mice with tuberculosis increased their susceptibility although on some of the citrate diets used the animals gained weight. Limiting intake to a low constant level or low protein content, so that no weight gain occurred, had little if any effect on tuberculosis susceptibility. Animals fed optimum diets *ad lib.* but deprived of food for 30 hours consecutively every week did gain weight but became highly susceptible to infection (Dubos, 1955).

Smith and Dubos (1956) working along similar lines with staphylococcal infections in mice showed that a period of starvation for 36 hours immediately before infection increased the percentage of deaths over the controls not so starved ; they also showed a 10-fold increase in viable count of the organism in the liver of the starved animals on any given day after infection compared with the controls. Water was allowed *ad lib.* to both starved and controls throughout. If 5 per cent. glucose was added to the water during the fasting period susceptibility was increased still further. Butyric, glutaric and pyruvic acids also increased the susceptibility if added to the drinking water. Animals, however, fed a very inadequate diet were shown to be capable of exhibiting a high resistance to infection provided they came into contact with the infectious agent only after having been maintained on this diet continuously and exclusively for several weeks. This observation may help to explain the detrimental effect of sudden changes of diet.

F. WHITE (Feb., 1957).

References

CLARK, P. F., *et al.* (1949). *Bact. Rev.* **13.** 99–134.
DUBOS, J. R. (1950). *J. Exp. Med.* **92.** 319–32.

Current Literature

REPORT

The East African Trypanosomiasis Research Organisation Annual Report for 1955-6 has recently been published, and describes important advances in knowledge and in techniques for studying trypanosomiasis and tsetse flies.

The location of flies has been one of the difficulties of tsetse control, for some species are not attracted to man, and are therefore hard to catch. Fly traps are giving good results, and are yielding some curious data. Hand-caught flies are usually males; the traps show that one reason for this is that females attack at different times of day. The blood meals of tsetses are being investigated; of the species tested it was found that *Glossina morsitans* and *G. brevipalpis* feed from choice on hippopotamus blood, *G. longipennis* on rhinoceros blood, *G. swynnertoni* on wart-hog blood, *G. palpalis* on reptile blood, and *G. pallidipes* on bush-buck blood. The host preference of the fly is closely related to the rate at which it acquires infection, and it is thought that the elimination of bush pigs in Zanzibar might lead to the eradication of the tsetse fly *G. austeni* and the cattle trypanosomiasis it carries, for it confines its attacks to bush pigs and cattle, in spite of the presence of other game.

Tsetse reaction to atmospheric humidity is also being studied. Tsetse flies have a highly efficient system of regulation of water loss, and are more active in a dry atmosphere, moving from very humid conditions to drier air. A new technique for discovering their resting places is to mark the flies with a paint fluorescing in ultra-violet light, and this has shown that they rest on trees between 3 and 15 feet above the ground.

Tsetses kept and bred in laboratories are found to thrive better when the sheep on which they feed are changed at intervals: it is believed that in time they produce a reaction in the host animal, and there is a limit to the number of tsetses the host can support.

The trypanosomes inoculated by the fly are found to be detectable by microscopic examination of the blood from the fourth day after inoculation. Baboons are proving useful in fly-infection experiments, for their blood is refractory to all trypanosomes and does not reduce the incidence of infection in newly caught flies. A strain of *Trypanosoma rhodesiense* was found to be still infective to man 22 years after isolation. Cortisone appears to have an inhibiting effect on the trypanosome, but at the same time to interfere with the acquired immunity of the host.

The earliest known epidemic of sleeping sickness occurred in the Upper Niger in 1374, but not until 1900 did it reach Lake Tanganyika and Lake Victoria. In Uganda the type of infection changed from *T. gambiense* to *T. rhodesiense* between 1901 and 1940, and the latter infection is now spreading slowly through Kenya, replacing *T. gambiense*.

The study of trypanosomes is not so far advanced as the study of the tsetse fly, but this report shows that considerable steps have been taken towards the better understanding and control of trypanosomiasis.

BOOK REVIEWS

Salmonellosis in Animals: A Review. BUXTON, A. 1957. 209 pp. Farnham Royal: Commonwealth Agricultural Bureau, Nr. Slough, Bucks. 25s.

The scope of this work is much wider than the title might suggest. It commences with a chapter on the general characters of the members of the Salmonella group followed by another on their classification serologically and by means of bacteriophage. A very well-referenced chapter is included dealing with the distribution of Salmonella serotypes amongst the different species of domestic and wild animals and containing a very useful table in which each serotype is listed separately with appropriate reference of its isolation from the different animals species. Further chapters are devoted to a full account of the clinical signs, pathological lesions, and epidemiology of the different diseases of domestic animals caused by the Salmonellae. The immunological and chemotherapeutic aspects of these infections are also dealt with very adequately. The final chapter is a really excellent, well-balanced account of the public health aspect and indicates the important part that animals and food products derived therefrom may play in the aetiology of outbreaks of food poisoning in the human population.

The author has succeeded in presenting a comprehensive and valuable review of a large subject, and this book is fully recommended, particularly to bacteriologists and those interested in the maintenance of the health of human beings as well as of animals.

The African Veterinary Handbook (Second Edition). P. Z. MACKENZIE and R. M. SIMPSON. Pitmans.

It is extremely difficult to keep a book of this nature completely up to date, and even at the time it is printed there is often a considerable lag in scientific discovery to be made up. Allowance must therefore be made for this difficulty, though generally speaking the book justifies the hope set out in the preface.

This little book could be described as a " vademecum " of veterinary science in Africa. It includes almost everything which appertains to diseases of animals in that continent and it must of necessity, therefore, be superficial in its approach to the subject.

The book is directed to the farmer and stockowner; and whilst there is very little missed out of the book, there is a tendency for over-simplicity, and this is evident in the Diagnosis Charts which are found at the beginning of each section.

It is surprising that amino-nitrothiazole is not recommended in the treatment of blackhead in turkeys instead of the out-dated arsenic therapy, or that there is no treatment for fowl typhoid.

Although reference is made to blood slides, I was unable to find a detailed description of how to make such a preparation. I think it will be agreed that diagnosis is often made difficult by the submission of poorly made blood films sent in by farmers and others. The subject matter of the book is well set out and the printing clear and easy to read. There is a good index and a useful glossary.

The P.D.S.A. and the Veterinary Profession

It is thought that our readers would be interested in the following correspondence published in the *Derby Evening Telegraph* over the signature of the Association's Senior Vice-President, Mr. Edward Wilkinson, and reproduced by courtesy of the newspaper. His original letter was as follows:—

" Statements have been published recently that it is the desire of a group of local people who have, I understand, formed themselves into a committee, to see the establishment in Derby of a dispensary run by the People's Dispensary for Sick Animals of the Poor.

" I believe that a sum of £200 was mentioned as having already been collected. In view of this and in order that the people of Derby may be under no misapprehension, I think that the following facts ought to be given publicity:—

" The veterinary profession, as represented by the Royal College of Veterinary Surgeons and the British Veterinary Association, was engaged for two years in negotiations with the P.D.S.A. under the independent chairmanship of Mr. George Brown, M.P., who was himself nominated by the Minister of Agriculture. These negotiations broke down some months ago.

" The negotiations were intended to try to bring about co-operation between the P.D.S.A. and the veterinary profession. The veterinary profession is most unhappy about the present P.D.S.A. arrangements for treating poor people's animals.

" Almost none of the P.D.S.A. dispensaries and caravans are staffed by veterinary surgeons. They are staffed by people who, in the opinion of the Champion Committee, should only be looked upon as partly trained ' stop-gaps ' until sufficient veterinary surgeons are available.

" The Champion Committee was appointed by the responsible Minister of the Crown. It was composed of very eminent people and was presided over by Mr. A. J. Champion, M.P. for South-east Derbyshire. The Champion Committee, the Royal College of Veterinary Surgeons, and the British Veterinary Association were, and are, satisfied that veterinary surgeons should and could be used on a whole- and part-time basis. This view was endorsed, without a division, after a debate in the House of Commons on a private P.D.S.A. Bill on Wednesday, March 20th. Those who rule the destinies of the P.D.S.A. refuse part-time services for reasons which are not understood by professional people.

" It would seem reasonable, therefore, that Derby people ought to understand that in supporting P.D.S.A. collectors they are not necessarily serving the best interests of the animals of poor people. Surely most Derby people will agree that the ill and injured animals of poor people, just as much as those of better-to-do owners, need and deserve the services of qualified veterinary surgeons.

EDWARD WILKINSON.

The P.D.S.A. Reply

" Mr. C. J. Bassett, General Secretary of the People's Dispensary for Sick Animals, states:—

" Your correspondent seems to have forgotten that the Veterinary Surgeons Act, 1948, prohibits the diagnosis and treatment of animals except by registered veterinary surgeons, registered veterinary practitioners, and persons licensed by the Minister of Agriculture under Section 7. The P.D.S.A. technical staff comprises all these classes of persons, all of whom are qualified in law to diagnose and treat animals.

" It is grossly untrue to say that the P.D.S.A. dispensaries are staffed by people who should only be looked upon as partly-trained ' stop-gaps.' Such a statement was never made by the Champion Committee.

" The P.D.S.A. technical staff consists of 12 registered veterinary surgeons, 82 veterinary practitioners registered on the supplementary register of the Royal College of Veterinary Surgeons, and 75 licensees. The latter have received four and a half years' training and must be considered by the Minister of Agriculture to be fit and proper persons to hold a licence.

" These are the people who staff the P.D.S.A. dispensaries and provide a service without which many thousands of sick and injured animals owned by poor people would be unable to obtain treatment."

★

A second letter

A week later the newspaper published a further letter from Mr. Wilkinson:—

" I should be obliged for the further use of your columns to reply to the General Secretary of the P.D.S.A., whose comments were appended to my letter published in your issue of April 5th.

" I have forgotten nothing of the Veterinary Surgeons Act of 1948. I am aware that it prohibits the diagnosis and treatment of animals except by registered veterinary surgeons, registered veterinary practitioners, and by persons licensed under section 7 of the Veterinary Surgeons Act, by the Minister of Agriculture.

" The public ought to be quite clear that a ' veterinary practitioner ' is not a veterinary surgeon within the meaning of the Act. A ' veterinary surgeon ' is a person qualified by virtue of his professional training. A ' veterinary practitioner ' is one of those persons who were treating animals, although not qualified in law to do so, prior to the passing of the Veterinary Surgeons Act of 1948.

" As has always been customary in this country it was felt, quite rightly, that such persons, if of good character, should be allowed to practise veterinary surgery legally, in order that their livelihood should not be taken from them; but that, in future, further unqualified persons would not be allowed to engage in the treatment of animals for personal gain.

" It appears from the General Secretary's published comment that the P.D.S.A. now employs 82 such persons.

Section 7

" Persons licensed under section 7 of the Act are people trained by the P.D.S.A. They may carry out certain restricted work, but they are not allowed to do anything in the way of surgery other than minor superficial operations.

" They may not, *e.g.*, ' make an incision into a body cavity, incise or remove any organ, or amputate a limb.' They were created in order to enable animal

welfare societies to bridge the gap between the passing of the Act and the availability of sufficient veterinary surgeons. The P.D.S.A., we are told, employs 75 of these people.

" It was for these reasons that I described the ' unqualified ' staff of the P.D.S.A. as ' partly-trained stop-gaps ' because, quite frankly, that is what they are, and it is not grossly untrue to say so.

" The General Secretary of the P.D.S.A. says that the Champion Committee did not describe these people as ' partly-trained stop-gaps.' I will quote paragraph 17 of that committee's report and leave your readers to judge for themselves.

" It is worded as follows:—

" ' Section 7 is a temporary expedient to meet a temporary situation. It does not imply that the holder of a licence is competent to engage in veterinary practice in the sense that a registered person is competent. Nor does the licence confer upon him any professional status. We accept the view expressed to us by the Royal College of Veterinary Surgeons that the whole essence of efficient veterinary practice is a thorough training in fundamental science as the foundation of ability to reach a correct diagnosis.

A Conclusion

" ' A report furnished to us, on the training given by the P.D.S.A. to its employees, expresses the opinion, with which we agree, that the tuition given, while suitable and adequate for certain limited purposes, falls far short of that given to a veterinary student. Without labouring the point unduly, a person who is not a fully-trained professional man is liable to make mistakes in diagnosis which, with more thorough training and greater knowledge, would be avoided.

" ' An incorrect diagnosis may involve unnecessary suffering to the animal or its premature destruction as incurable. Our conclusion is, therefore, that so long as the licensing system continues the animals of the poor will not receive the best diagnosis and treatment. We feel strongly that it is in the public interest that the object of the Act—to bring to an end the practice of veterinary surgery by unregistered persons—should be achieved as soon as practicable, for to prolong the system unnecessarily would be contrary to the spirit and intention of the Act and detrimental to the interests of the animal.'

' Misunderstanding '

" It would be possible to quote a very great deal more, in support of my original letter, both from the Champion Committee Report and from Hansard of March 20th last, when these matters were very thoroughly debated in the House of Commons. However, you have already afforded me a great deal of your valuable space, for which I thank you sincerely.

" It is to be hoped that the correct status of the 157 persons who are almost completely responsible for the treatment of animals by the P.D.S.A. will be better understood by your readers. At the present time there is a very great deal of misunderstanding by the public and it was for that reason that I wrote to you in the first place.

EDWARD WILKINSON.

The P.D.S.A. Reply

" Mr. C. J. Bassett, General Secretary of the People's Dispensary for Sick Animals, states:—

" As Mr. Wilkinson acknowledges that the staff of the P.D.S.A. are qualified under the Veterinary Surgeons Act, 1948, one wonders what is the real object of this correspondence.

" He has gone to great pains to disparage the work of a section of the P.D.S.A. staff and he now attempts to do the same in regard to registered veterinary practitioners—not only those employed by the P.D.S.A., but all of them, of whom there are some 280 on the Register.

" He omits to inform your readers that every veterinary practitioner, apart from being of good character, was required, before being placed on the Supplementary Register of the Royal College of Veterinary Surgeons, to fulfil an essential condition, namely that he had for a period of not less than seven years been engaged as his principal means of livelihood in diagnosing diseases of animals and giving medical and surgical treatment to animals and that even before the 1948 Act they were doing perfectly lawful work.

" He must be aware that the majority of veterinary practitioners are men of many years' experience in the diagnosis and treatment of animals and are permitted in law to do exactly the same work as a registered veterinary surgeon.

" I am quite sure your readers are well able to draw their own conclusions on the merits of this correspondence."

★

The Senior Vice-President's final letter was in the following terms:—

" I hope that I may be allowed to make two comments in reply to the remarks of the General Secretary of the People's Dispensary for Sick Animals, which you printed below my letter of April 17th.

" It seems that the general secretary believes that to inform the public of established facts is to ' disparage the work of the P.D.S.A.' It is possible that your readers will not accept that point of view.

" The General Secretary also ' wonders what is the real object of this correspondence.' The answer is very simple. It was entered upon purely as a matter of giving factual information to those of the public who are interested. No attempt was made to do more than just that.

" If any of your readers are sufficiently interested they will find further information in two official publications, namely, Report of the Committee on Licences under Section 7 of the Veterinary Surgeons Act, 1948 (Report of the Champion Committee), and Hansard for March 20th last—both obtainable from H.M. Stationery Office, price 9d. each.

" Please accept my renewed thanks for affording me the hospitality of your columns.

EDWARD WILKINSON."

A. I. OVERSEAS

The Milk Marketing Board has issued a statement that 57 per cent. of all cattle of breeding age in England and Wales were artificially inseminated in the year ending last March. The Board has now appointed an agency in Australia to handle enquiries and traffic in frozen semen, to be sold overseas, and an initial batch of 2,000 c.c. of semen is ready to be sent.

Dr. Joseph Edwards, head of the Milk Marketing Board's Production Division, is reported to have said he was sure this would not harm the export of live cattle, but should, on the contrary, " fly the flag " of British breeds in countries where they are not at present widely known.

The Victoria Veterinary Benevolent Fund

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at 10, Red Lion Square, London, W. C. 1, on Friday, April 26th, 1957, when the following members were present:—

Mr. H. W. Dawes (President) in the Chair, Messrs. J. Atkinson, E. P. Barrett, E. Clark, Major J. J. Dunlop, Mrs. D. I. Glover, Mr. A. A. Lamont, Professors R. Lovell, J. McCunn, Mrs. B. Pugh, Professor L. P. Pugh, Miss V. Tillemont-Thomason, Miss O. Uvarov, Captain. W. Watt, and Major W. H. Wortley.

Mr. C. W. Francis, Secretary, in attendance.

Minutes

The Minutes of the previous meeting, held on February 11th, 1957, having been published in THE VETERINARY RECORD, were taken as read and signed as correct.

Apologies for Absence

The Secretary reported the receipt of apologies for absence from Mr. R. C. U. Fisher, Dr. R. E. Glover, Professors A. Messervy, W. M. Mitchell, Messrs. J. N. Ritchie, J. F. D. Tutt, Professor W. L. Weipers, and Captain A. Whicher.

Correspondence

The Secretary submitted:—

(a) A letter from the Secretary of the South-eastern Veterinary Association stating that Mr. R. C. U. Fisher had been elected as their representative on the Council in the place of Dr. R. F. Montgomerie, who found it difficult to attend meetings.

(b) A letter from Messrs. Edmonds & Ledingham, Solicitors, of April 4th, referring to their previous correspondence and enclosing a cheque for £50, being legacy bequeathed to the Fund by the late Duncan Cumming, Aberdeen.

Hunting Trust

The Secretary reported that the audited accounts disclosed a surplus in the Hunting Trust, as on December 31st, 1956, of £884 4s. 5d., and that in accordance with the terms of the Trust, this sum was transferred by the Trustees to the V.V.B.F. General Account on March 19th last.

Investments

The Treasurer reported:—

(a) That the Executive Committee had invested the Hunting Trust surplus of £884 4s. 5d., received on March 19th, in the purchase of £1,124 7s. 0d. 3½ per cent. Funding Stock, 1999/2004.

(b) That the Fund's holding of £1,750 2½ per cent. Defence Bonds (P.O. Issue) which matured on March 28th, 1957, had been re-invested by the Executive Committee in 4½ per cent. Defence Bonds (Conversion Issue), repayable in 1967 at £105.

It was resolved that the action of the Executive Committee be approved.

Accountant's Report

The Secretary submitted the following report which was approved, a vote of thanks being accorded to the respective donors:—

Since the previous quarterly meeting the following legacy, Life Membership Subscription, Donations, and Special Subscriptions have been received:—

	£ s. d.	£ s. d.	£ s. d.
Legacy			
Duncan Cumming			50 0 0
Life Membership Subscription			
J. B. Stevenson			10 10 0
Donations and Collecting Boxes			
Central Veterinary Society	3 5 10		
	3 13 5		
		6 19 3	
Scottish Regional Group Association of Veterinary Teachers and Research Workers		5 0 0	
Scottish Metropolitan Division ...		3 9 10	
Southern Counties Veterinary Society		1 10 0	
Ayrshire Veterinary Association ...		15 0	
			17 14 1
Eastern Counties Veterinary Society			10 0 0
J. E. Johnson			3 3 0
North of Ireland V.M.A.			20 0 0
Plymouth Elburton Evening Townswomen's Guild (in appreciation of lecture by A. M. R. Nelson) ...			1 1 0
Southern Counties Veterinary Society			10 10 0
Yorkshire Veterinary Society ...			5 5 0
			128 3 1
Special Subscriptions			
A. M. McCallum		10 0 0	
Western Counties Veterinary Association		2 2 0	
			12 2 0
			£140 5 1

Life Member

It was unanimously resolved that Mr. J. B. Stevenson be elected a Life Member of the Fund.

Cases

No. 245, widow, aged 72. Underwent serious operation in 1955. The President reported that following the instructions given at the previous meeting, he has arranged for this recipient to be visited by a local member, and as a result of his report, the Executive Committee decided to increase her allowance by 10s. per week, as from March 1st.

It was resolved that the action of the Executive Committee in increasing her grant to £2 10s. 0d. per week be confirmed, and that the case be further reviewed in 12 months' time.

No. 276, widow, aged 72. Suffers with arthritis. Very little income. The Secretary was instructed to make enquiries as to whether she was entitled to receive an old-age pension. In the meantime, a special payment of £10, plus a grant of £1 per week, be made in this case.

No. 295, widow, aged 43. Daughter, aged seven. Application for grant towards child's education. The Secretary reported that in accordance with the instructions given at the previous meeting, a member of the Ladies' Guild, who resides in the vicinity, called on this applicant and discussed with her the question of her daughter's education, and other general matters. The visitor's report was referred to the Executive Committee who decided, in

view of its contents. that it would be in the child's best interests it she continued her studies at the local school for the time being, and accordingly no grant was made.

It was resolved that the action of the Executive Committee be approved.

No. 301, widow. Husband died on January 23rd, 1957. Three children, ages 26, 23, and 20. Grant £4 per week continued to the end of March. This case was further reviewed and in view of the information given in a letter received from the widow on April 13th,

It was resolved that assistance from the Fund towards the younger daughter's education be continued until December 31st, 1957, but that the grant be reduced by half, namely £2 per week, to take effect as from April 1st.

No. 314, M.R.C.V.S. Died on March 30th, 1957. The Secretary submitted correspondence in this case regarding funeral expenses and it was decided that the account, amounting to £30, be paid by the Fund.

The offer of a member of Council to visit the widow and to discuss her case with the National Assistance Board was warmly accepted.

No. 317, son of late member, aged 61. Almost blind. Referred to the Executive Committee at the February meeting. The Executive Committee reported that a special grant of £25 had been made in this case and that a local member of Council had undertaken to pay this to the beneficiary in monthly sums of £5.

It was resolved that the action taken by the Executive Committee be approved.

The following eight cases were submitted for review:—

No. 105, widow, aged 70. In poor health. Son and daughter, both married, unable to help. It was agreed to continue the present grant, but case to be visited by a local member of Council whose report, if necessary, be dealt with by the Executive Committee.

No. 204, daughter of late member, aged 61. Receiving old-age pension and £1 per week under a legacy.

It was resolved that a member in the locality be asked to visit this case on behalf of the Council. Meantime, grant of £1 per week be continued.

No. 265, widow, aged 66. In poor health, and lost the sight in one eye. Son, aged 30, daughter aged 36, Ward Sister, allowing mother 25s. per week. Receiving £2 per week from the Fund.

It was resolved that the local member be asked to visit this case on behalf of the Council, the grant in the meantime being continued.

No. 269, daughter of late member, aged 71. Living apart from husband, who is blind. Income: old-age pension. It was decided that the grant of £1 per week be continued and the offer of a member of Council to call on this recipient and submit a report, be warmly accepted.

No. 290, widow, aged 58 Partially blind. Daughter, aged 21, at work. Son, aged 18, student. The Secretary, having given details of this case, *it was resolved*

(a) that the Secretary be instructed to obtain further particulars;

(b) that the grant meanwhile be continued;

(c) that the Executive Committee, if necessary, be empowered to act in this case.

No. 299, widow, aged 61. Income: pension under National Insurance Acts, and a little from lettings. Receiving grant of £3 per week.

It was agreed that the grant be continued for a further 12 months.

No. 305, widow, aged 60. Three married daughters and one son. Keeps home for son who occasionally gives her £1.

It was resolved that the local veterinary surgeon be asked to visit this case on behalf of the Council. In the meantime, the grant of £2 per week be not disturbed.

No. 306, widow, aged 47. Three sons, ages 17, 14, and 10. Receiving financial help towards children's education.

It was resolved

(a) that the grant for the next 12 months be £150, payable monthly, as from April 1st, 1957;

(b) that the Secretary be instructed to reply to her letter of April 16th on the lines indicated by the Council.

Annual Report and Statement of Accounts

After careful consideration of the draft Annual Report, which had been circulated, *it was resolved* that the report be approved for issue to the members prior to the Annual General Meeting.

Date of Next Meeting

The date of the next meeting was left in the hands of the Executive Committee.

Vote of Thanks

On the motion of Mrs. Glover; seconded by Major Dunlop, a hearty vote of thanks was accorded to the Chairman.

News and Comment

THE QUEEN'S BIRTHDAY HONOURS

In the recently published list, several names will be of interest to the profession. Mr. D. S. Clouston, M.R.C.V.S., was awarded the O.B.E., and Mr. E. G. Rayner, Superintendent of the Department of Veterinary Services, Tanganyika, received the M.B.E. Captain J. A. L. Duncan, M.P., a Privy Council representative on the Council of the R.C.V.S., was created baronet, and Mr. J. Arthur Rank, whose work for the Animal Health Trust has been of such great value to veterinary research, was raised to a Barony. Mr. W. Ward of the Virus Research Unit, Glaxo Laboratories Ltd., received the O.B.E.

THE ROSS CENTENARY

The Ross Institute of Tropical Hygiene celebrated the centenary of the birth of its founder, Colonel Sir Ronald Ross, K.D.B., K.C.M.G., F.R.S., LL.D., M.D., D.SC., F.R.C.S., D.P.H., L.S.A., on June 13th. Ross's discovery of the transmission of malaria by mosquito bite was announced to the Tropical Section of the British Medical Association in 1898: it is said to have created such a sensation that members stood up and cheered.

Ross had been carrying on his research in conditions of appalling difficulty. He spoke of his "dark, hot, little office" in Secunderabad, India, where the heat was so intense that the screws of his microscope became rusted with sweat; its eyepiece was cracked, and he could not use a punkah because the draught blew away his mosquitoes. At a crucial point in his research he was transferred by the Army to Calcutta, where an epidemic of plague brought his work on human malaria to a standstill; but he continued to work on the malarial parasite of birds, and it was then he demonstrated the fact that the parasite, within the mosquito, divided into thousands of minute threads and passed into the salivary glands, to be injected into the host with the mosquito's bite. The importance of this discovery reached beyond the field of malaria, for it showed for the first time that diseases could be transmitted by insect bite, and within a few years many other diseases were found to be carried in the same way.

Soon afterward Ross resigned from the Army and became Professor of Tropical Medicine at Liverpool, later being appointed Consultant on Malaria to the War Office. He was a tireless advocate of land drainage, and near the end of his life he made a triumphant tour of Malaya to see something of the results of his work.

HARVEY TERCENTENARY BANQUET

The Harvey Tercentenary Banquet, which took place at Folkestone—Harvey's birthplace—on Saturday, June 8th, brought together some of the most famous physicians and surgeons of the day. Carried out in the Elizabethan style, with a menu reminiscent of a bygone age, the tables lit by candles held in magnificent candelabra, the serving maids dressed in period costume and the courses punctuated by the entry of madrigal singers, the banquet was an occasion memorable in the extreme.

Speeches by Sir Geoffrey Jeynes, M.D., F.R.C.P., F.R.C.S., Professor D. M. Dunlop, F.R.S., B.A., M.D., F.R.C.P. (President of the Harveian Society of Edinburgh), and Sir A. Dickson Wright, M.S., F.R.C.S. (President of the Harveian Society of London), were received with enthusiasm by the company of some 400 guests from home and overseas.

The distinguished guests who occupied the main table at the banquet included Professor Harold Burrow of the Royal Veterinary College and Mrs. Burrow.

UNIVERSITY NEWS

Edinburgh

The undermentioned candidates have passed in the subject of Veterinary Preventive and State Medicine of the Final Professional Examination (Part II) for the degree of Bachelor of Veterinary Medicine and Surgery:—

Brown, Kenneth; and Mair, John H.

The undermentioned candidates have passed in the subject of Veterinary Obstetrics of the same examination:—

Kingston, John B.; McCabe, David W. M.; Macnab, Peter J.; and Moody, Peter W.

" DICK " RIDING COMPETITION

The Horse Society of the Royal (Dick) School of Veterinary Studies held its third annual riding competition in the Bush Estate on May 25th. This year the events consisted of the British Horse Society's Preliminary Dressage Test, show jumping, and a small but difficult cross-country course. The college entered nine horses out of a total of 26 entries. The show jumping standard was very high, and at the end of the first round, the College horses had five clear rounds. After a timed jump-off, first place was awarded to one of the College horses ridden by J. Needham. In the cross-country, a College horse took second place.

The Competition was judged by Mrs. Watherston who was assisted in the jumping and gymkhana events by Dr. Sykes and Mr. Hutton. About 500 spectators were present including many of the College staff. The prizes were presented by Mrs. Montgomery, wife of the Dean of the Faculty. The Staff Cup, for the best veterinary student performance, was presented to G. Young, who also received a replica cup donated by Professor Mitchell. The planning and organisation of this very interesting and enjoyable function was carried out by Mr. G. S. Ferguson assisted by Mr. T. Stewart and a large number of willing helpers.

THE ROYAL RICHMOND HORSE SHOW

In view of a commendation in *The Times* of the " fine work carried out by a devoted band of workers headed by the show directors " in coping with the effects of fire, readers will be interested that the chairman of the directors is Mr. T. A. Dobie, a veterinary surgeon. Among the judges, and acting as a referee, was another noted member of the profession, Mr. Howard Dawes.

The show, described as the most brilliant since the war, attracted a record attendance of over 14,000.

RABIES AND BATS

In the United States at least 150 insect-eating bats have been found infected with rabies in 15 different areas. There have also been two cases of human rabies in the United States which may have been caused by the bite of insectivorous bats. Moreover, it has long been established that the disease is actually transmitted to man and animals by blood-sucking (vampire) bats in certain latin American countries. Recently, reports reached the World Health Organisation from Yugoslavia that insect-eating bats might be transmitting rabies in that country also, and the danger that the common bat may constitute a source of rabies infection for human beings in Yugoslavia and other countries of Europe has aroused concern among health authorities. In response to a request from the Yugoslav Government, WHO sent Dr. Ernest Tierkel, Chief of Rabies Control Activities, U.S. Public Health Service, to the Pasteur Institute at Novi Sad, near Belgrade, to make a special study of the situation in Yugoslavia. Further studies are being organised at the Institute concerning the possible rôle of insect-eating bats in the transmission of rabies, and it is hoped that the institute may serve as a centre for similar studies of the problem in other European countries.

The WHO Expert Committee on rabies has recognised the importance of wild-life rabies in many countries of the world and has issued a warning that such reservoirs of the disease were of an extent and nature that demanded special efforts to control them.

FOWL PEST IN SCOTLAND

After a lapse of six years there has been a recurrence of fowl pest in Scotland. The first case was confirmed on May 29th, and in tracing the source of this, poultry on other premises have been found to be infected. The following are the counties in which cases have been confirmed to date:—

Aberdeenshire, 19: Banffshire, five; Angus, one; Kincardineshire, one; Inverness-shire, one; Dunbartonshire, one; and Orkney, two.

PERSONAL

Births

FELL.—On June 14th, 1957, at 33, Belvidere Street, Aberdeen, to Margaret, wife of Bernard F. Fell, M.R.C.V.S., a daughter, Jessica Frances, sister for Susan.

STEWART.—On June 16th, 1957, to Ruby, wife of Gilbert H. Stewart, M.R.C.V.S., of 21, Stobhill Villas, Morpeth, Northumberland, a daughter, Karen Margaret.

Marriage

SMYTH—HOWARD COLLINS.—On May 27th, 1957, at Caxton Hall, Westminster, Richard Samuel Smyth, M.R.C.V.S., D.V.S.M., to Murial Constance Howard Collins, of Parkside Farm, Sparkwell, Plympton St. Mary, Devonshire.

Dr. W. R. Wooldridge and Mrs. Wooldridge were At Home to a large number of guests last Saturday evening. Leading members of the profession, of the universities and other bodies, and personal friends, enjoyed very generous hospitality in their host's beautiful house and garden, the perfect weather adding still further to the general pleasure.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

BARROWCLIFFE, Ernest James, 39, Hastings Road, Swadlincote, Burton on Trent, Staffs. Graduated London, July 17th, 1909. Died June 17th, 1957, aged 73 years.

COMING EVENTS

June

26th (Wed.). Summer Meeting of the Sussex Veterinary Society in the Zoological Gardens, Regent's Park, London, 2.30 p.m.

27th (Thurs.). Meeting of the Lakeland Veterinary Association at The Hydro, Windermere, 6 p.m.

Meeting of the British Small-animal Veterinary Association at the Stork Hotel, Liverpool, 8.30 p.m.

Annual General Meeting of the North of Scotland Division at Chapel Croft Cattle Breeding Centre, Bucksburn, 2.30 p.m. Business meeting at Craibstone Men's Hostel, 4.15 p.m.

July

3rd (Wed.). Summer Meeting of the A.V.T. & R.W.s (Northern Region) at The School of Agriculture, University College of North Wales, Bangor, 10.45 a.m.

5th (Fri.). Annual General Meeting of the Lincolnshire and District Division at the George Hotel, Grantham, 2.15 p.m.

16th (Tues.). Annual General Meeting of the Welsh Branch of the B.V.A. at the Belle Vue Hotel, Aberystwyth, 2.15 p.m.

August

25th-31st. 75th Annual General Meeting and Congress of the B.V.A. at Cambridge.

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS IN LONDON

Wednesday, July 10th, at 7, Mansfield Street, London, W.1.

10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Farm Live-stock Committee.
2.15 p.m. Home Appointments Committee.

Thursday, July 11th, at 7, Mansfield Street, London, W.1.

10.00 a.m. Parliamentary and Public Relations Committee.
11.30 a.m. Small-animals Committee.
12.00 noon Finance Sub-committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, July 12th, at Connaught Rooms, London, W.C.2.

10.30 a.m. Council Meeting.

R.C.V.S. Examinations

June

27th (Thurs.). M.R.C.V.S. Written Examinations.
28th (Fri.). M.R.C.V.S. Written Examinations.

July

1st (Mon.). M.R.C.V.S. Practical and Oral Examinations commence (Panels "A" and "B").

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Berks. Biliingbear Farm, Binfield, Bracknell (June 8).
Lancs. Colbournes Farm, School Lane, Latham, Ormskirk (June 11).
Norfolk. Brickyln Farms, Hoe, East Dereham (June 11).
Stirling. Balmulzier Farm, Salmannan, Falkirk (June 8).
Yorks. Quarry Allotments, East Avenue, South Elmsall, Pontefract (June 6).

Atrophic Rhinitis

Essex. Brickhouse Farm, Tillingham, Southminster (June 12).

Fowl Pest

Aberdeen. The Manse, Tarves (June 6); Darvel, Church Street, Huntley (June 10); Braighead, Cruden Bay (June 11); 137, North Street, Inverurie; Dams of Craigie, Whitecairns (June 12); Sandhole, Mintlaw Station (June 13).
Carmarthen. Deildref, Clynderwen (June 13).
Banff. Invermay Cottage, Nethermills, Grange, Keith (June 11).
Dunbarton. Carmelite Monastery, Dumbarton (June 11).
Inverness 7, Druimlon, Drumnardrochit (June 10).
Lancs. Manor House Farm, Town Lane, Much Hoole; Cunliffe Fold Farm, Salwich, Preston (June 8); Bamford Farm, Grange Lane, Hutton (June 10); Tan-y-Bryn, Lands Lane, Longton (June 12); Tusons Farm, Marsh Lane, Longton; Heatherfield Farm, Moss Lane, Little Hoole, Preston (June 13).
Orkney. Old Voy, Toab, Kirkwall (June 8); Braehead, Toab, Kirkwall (June 11).
Surrey. 60, Woodmansterne Lane, Wallington (June 8); 14, Little Woodcote, Wallington (June 13).

Yorks. County Farm, East Heslerton, Malton (June 8); Horse and Jockey Inn, Horbury Bridge, Wakefield; 15, King Street, Horbury Bridge (June 12); Stepney Rise Allotments, Scarborough (June 13).

Swine Fever

Berks. Draycott Moor Farm, Draycott Moor, Abingdon (June 8).
Bucks. 15, Southlands Road, Denham (June 11).
Devon. Holcombe Barton, Ottery St. Mary (June 8).
Durham. The Dene, Hedworth, Jarrow (June 11).
Essex. Weald Bridge Farm, Weald Bridge Road, North Weald (June 11).
Hants. Piggeries at Gales Brewery, Horndean, Portsmouth (June 8).
Herts. Hart Hall Acres, Harthall Lane, Kings Langley (June 11).
Kent. Smithers Farm, Cowden, Edenbridge; Stiff Street Farm, Bredgar, Sittingbourne (June 11).
Middx. Trout Farm, Yiewsley, West Drayton (June 13).
Somerset. Melcombe Farm, North Petherton, Bridgwater (June 13).
Staffs. 242, Tixall Road, Stafford (June 11).
Surrey. Woodlands Farm, Cowden, Edenbridge (June 8); Piggeries near Jolly Farmer, London Road, Camberley (June 11).
Sussex. Headhone Farm, Lidsey, Bognor Regis (June 12).
Worcs. Transport Café, Shenstone, Kidderminster (June 8); Sunrays, Droitwich (June 12).
Yorks. Terrace House Farm, Burstwick, Hull (June 11); Market Place Farm, South Cave, Brough; Hill Farm, Aldbrough (June 12).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

A New Anthelmintic

Sir,—The issue of THE VETERINARY RECORD of June 1st contained an advertisement by Imperial Chemical Industries announcing the discovery of a new drug for the treatment of lungworm disease which "removes lungworms."

I hope that this new drug will be as revolutionary as the advertisement would lead us to believe; but on reading the circular which we have received about this product, I find that the manufacturers are a little more cautious about its effectiveness.

For instance, it is claimed that a "large proportion" of the larvae will be removed only if there is no inflammatory exudate or pus present in the lungs. It would, therefore, appear that this drug is more likely to be effective in the treatment of in-contact animals than those showing clinical signs of husk.

A preparation of this product is on sale direct to farmers for oral use, and members of the profession will be receiving enquiries as to its efficacy. It seems to me that a drug firm launching a new product should not embark on an advertising campaign without publishing details of field trials either beforehand or at the same time.

Yours faithfully,

J. N. GRIPPER.

6, Ryde Hill Road,
Guildford, Surrey.

June 4th, 1957.

Conditioned Reflex in a Bull

Sir,—The following case of a conditioned reflex may well interest your readers.

A 16-year-old Dairy Shorthorn bull standing at the Cambridge Centre is regularly and successfully used to provide semen by electro-ejaculation as referred to in my article last year (*Vet. Rec.* **50.** 1,015). This technique is always carried out with the bull standing in the same corner of his loose-box.

The stockman reported to-day that the bull was slightly lame and prior to examination he tethered him in that same corner. It was noticed at once that a cloudy liquid began to drip from his sheath and about 15 c.c. was collected in a test-tube. On microscopical examination it was seen to contain not only large numbers of epithelial cells but quite a few actively motile and apparently normal spermatozoa.

Your correspondent wonders if perhaps this is the first of a long line of bulls capable of producing semen to the ringing of a "Pavlov bell"!

Yours faithfully,

V. J. A. MANTON.

The Gravel Pits,
Huntingdon Road,
Cambridge.

June 14th, 1957.

Ring Womb in Ewes

Sir,—In commenting recently on Mr. Straiton's article on obstetrics I did not mention ring womb in ewes because my letter was already too long without it. I should not be troubling you again were it not that in the meantime my advice has been sought in an outbreak of ring womb of most unusual origin and of quite exceptional severity.

Some Australian wool producers, either because of labour difficulties, or because they have enough land to make a good living from sheep without the worries of breeding, practice what is here called "dry sheep" farming. Their flocks comprise wethers and ewes but no rams, and are maintained by buying in young sheep from time to time. The farmer who consulted me had bought at public auction 100 full-mouth Polwarth ewes from such a "dry sheep" property and, without realising that they were maiden ewes, had mated them to his own rams. Recently their time for lambing arrived, but with very few exceptions the ewes could not deliver their lambs. By the time I arrived some ewes had already died, but I saw several alive all with obvious ring womb.

I mentioned the current correspondence in THE VETERINARY RECORD and suggested that as my client did not like the idea of caesarean section he might try waiting and watching for a day or two.

The result was that all the affected ewes died except one, in which the foetus was so far decomposed that I was able to extract it piecemeal with a Rampley's forceps. Of the remaining 40 only about 20 now are living, and the owner has agreed to watch them and submit any further cases without delay to operation as the only hope of saving them.

May I suggest that this would seem to show Mr. Straiton in error about the course of ring womb in

ewes, although it must be admitted that the circumstances are exceptional.

I have not had former experience of what can happen when maiden full-mouth ewes are mated, and record this instance in the hope that it may save others from trouble in the future. Apart from this incident our experience in Tasmania generally is identical with that so well put by A. Cameron Gibson in THE VETERINARY RECORD of April 27th, 1957. In Mr. Gibson's words: "The true ring womb, complete or partial, will not relax at all, even if left for several days—caesarean section or slaughter seem the only alternatives."

Yours faithfully,
J. W. RAINEY.

P.O. Box 61
Westbury, Tasmania.

June 7th, 1957.

Caesarean Section on Deer Carcases

(This letter was received by courtesy of Mr. Oliver Jones, M.R.C.V.S., Curator of Mammals and veterinary officer to the London Zoological Society.)

Sir,—About a year ago I shot accidentally a female Thompson gazelle, which appeared to be carrying. My wife and I performed a caesarean on the carcase with success, a fact which I reported to the Game Department here. They were rather surprised that this was possible and told me they never heard of such a thing before.

That the caesarean on the Thompson gazelle need not be an exception, is proved by the fact that I later shot a female impala found to be carrying in its last stages. A caesarean was performed again and with success.

Both animals are in perfect health; the Thompson gazelle is over a year old. Both are females. We leave them free to roam about the house and in the garden. The impala still gets her bottle of milk daily, the Thompson gazelle every two or three days, although both feed on the grass (and flowers—ours as well as the neighbours').

The idea of performing such a caesarean section was put in my head when I once watched a zebra, which was carrying, being cut up for meat. The young animal was nearly ready and its heart kept on beating for some time after it was separated from the body of its mother. It did not start breathing, however, cooled very rapidly, and died soon afterwards.

The Thompson gazelle was shot through the neck and therefore died instantly, as was also the case with the impala. When approaching the carcase we noticed its belly heaving and realising what was the matter, my wife and I mustered all the anatomical knowledge we possess between us, and I cut open the belly with a sharp knife, taking care not to touch anything inside. Realising that the blood circulation of the mother had stopped and that the young animal could therefore not get any oxygen, I opened the bag/uterus carefully with the point of the knife at a place which looked harmless and tore the rest open with my fingers. Then I lifted the little animal up on its hind legs, cut the navel cord and wrapped the little body with woollen clothing—my wife's cardigan as a matter of fact. I held the animal in an upside down position and it began breathing quite soon. In about 20 minutes my wife could hold it in her arms normally, so that we could transport it to the nearby farmhouse, where we cleaned it with dry rags and tied the navel cord. We took the animal to our house some 35 miles by car and that evening it took some cow's milk from a teaspoon. Night was passed in a box with dry grass, a hot-water-bottle and a baby blanket. Within 24 hours the little creature leaped out of its box and stumbled around. Thereafter it was fed from a bottle on two-thirds sterilised (not boiled) or raw cow's milk, one-third water, plus a teaspoon of lime water per feed.

The caesarean on the impala was along similar lines. In this case there was a lot more slime and mucus to be dealt with. We kept this animal upside down for some time, under which condition it appeared to be breathing quite freely; but it gave signs of becoming choked when in the normal position. After a strenuous hour, the breathing settled. After that improvements were fantastic. This animal walked within two hours and ran after six hours although shakily.

Yours faithfully,
H. B. DE ROO.

c/o Netherlands Trading Society,
Nairobi, Kenya.

May 22nd, 1957.

ADVERTISER'S ANNOUNCEMENT

BIOREX (MARKETING) LTD., announce that Messrs. J. M. Loveridge Ltd., of 6, Millbrook Road, Southampton, have been appointed sole distributors of the veterinary range of Biosone G.A., containing the active isomers of glycyrrhetinic acid. All enquiries for Biosone G.A. products should be addressed to Messrs. J. M. Loveridge, and the products are also available from all reputable veterinary wholesalers.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th May, 1957		16	1	1	31	—	31
Corresponding period in	1956	38	—	3	19	—	49
	1955	27	—	—	16	—	86
	1954	20	—	—	30	—	68
1st January to 15th May, 1957		192	3	16	323	—	307
Corresponding period in	1956	972	3	11	238	—	282
	1955	376	—	6	225	—	570
	1954	126	—	12	499	—	552